TRS-80® COLOR COMPUTER

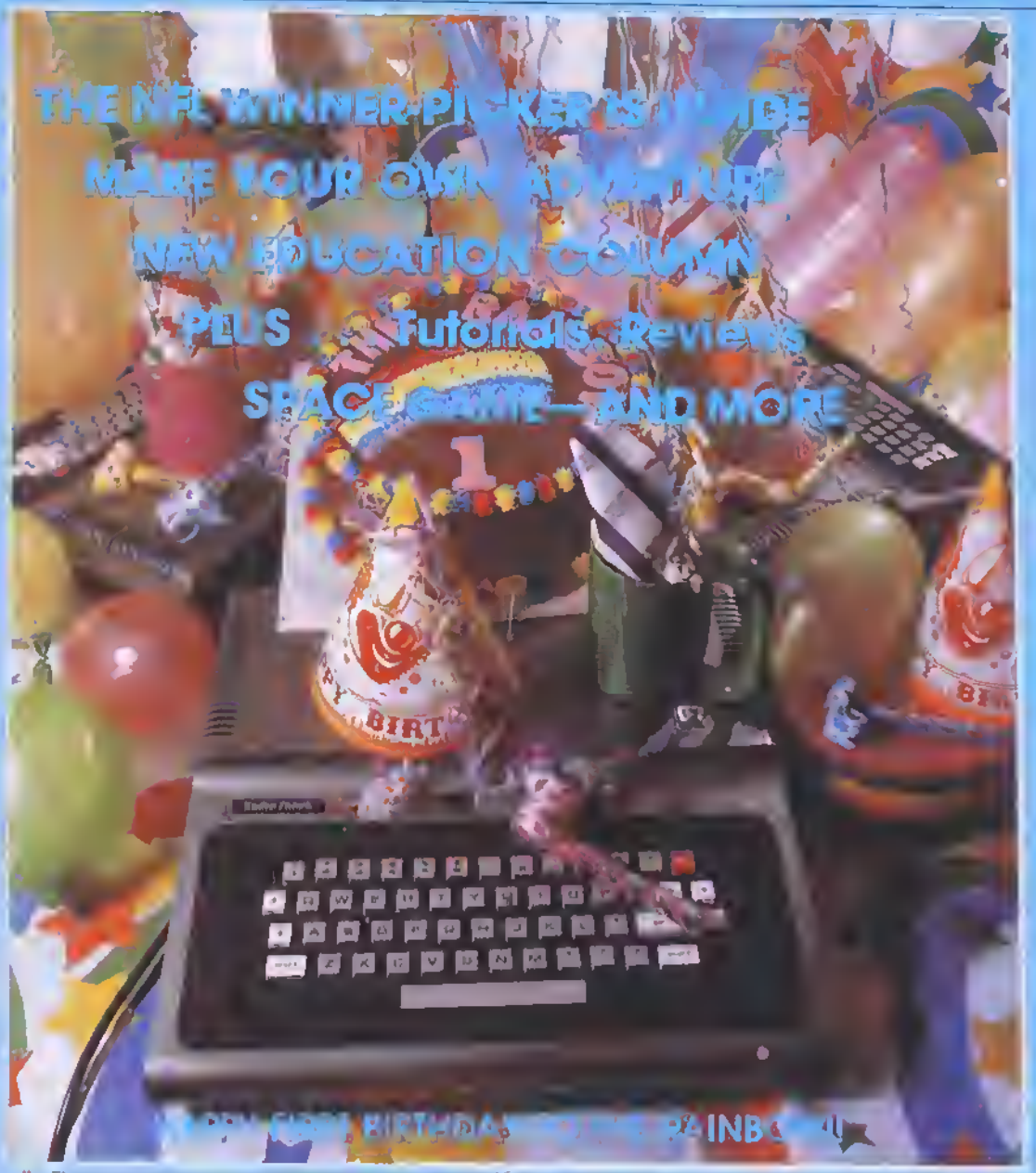
RAINBOW'S SPECIAL FIRST BIRTHDAY ISSUE!!

July, 1982
$2.50

the RAINBOW

The Monthly Magazine for Color Computer Users

Volume II Number 1



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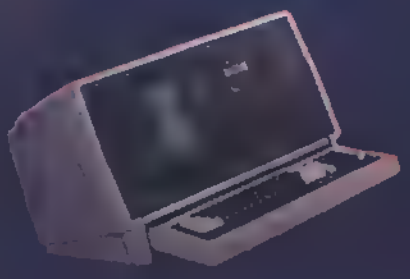

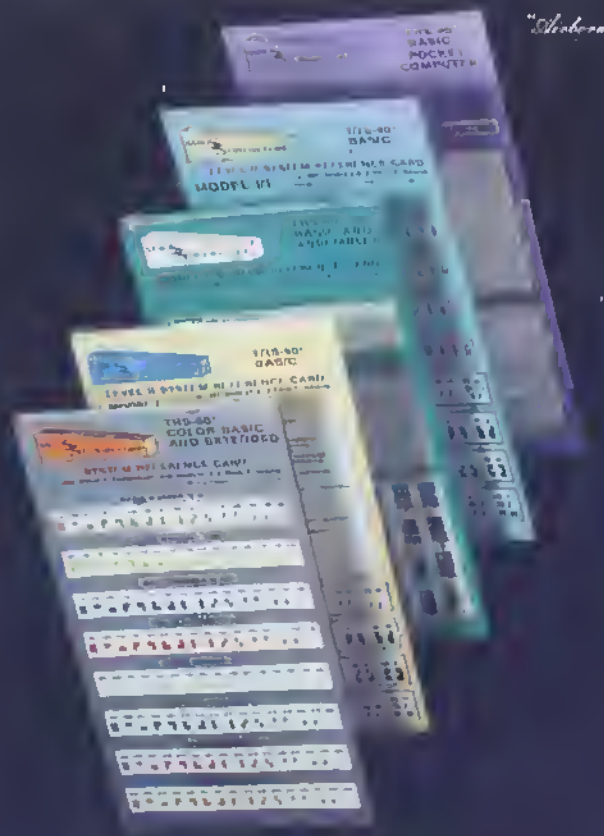

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PRINT USING Examples
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Reserved Words
Special Keys.
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Flags, Conditions, & Chart
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SVC Procedure Panel
Host Logon Panel
Version 2.0 Lib Command Formats
and System Utility Formats.
Basic Functions & Statements
DOS File Naming Convention
Basic Commands & Edit
Subcommands
Special Keys
Basic Internal Codes and
Reserved Words
Basic Msgs & Codes
PRINT USING Examples
Special Characters
DOS Utilities & BASIC Command
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Control Codes

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6 Panels, 12 Pages
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Control Codes.
Cassette Loading Err Msgs.
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Subcommands, Special Chars,
Basic Statements, Facts,
Functions, Derived Functions,
Special Operations (POKEs)
PRINT USING Examples.
Basic Msgs. & Codes.
Basic Internal Codes.
Reserved Words.
Screen Line Layout.
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10 Panels, 20 Pages
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Complete Z80 Instructions,
Assembler Instructions, Commands,
Operators.
Series I Editor/Assembler
Commands & Edit Subcommands.
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Assembler Error Msgs.
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[illegible] Memory Map
APPLESOFT [illegible] BASIC
[illegible] Statements
[illegible] Functions
Derived [illegible]
[illegible] Characters & Graphics
Disk A[illegible] Utility Commands
Pokes, Peeks, Call
Monitor [illegible]
Key & Control Functions
APPLESOFT Internal Code
APPLESOFT Reserved Words
Integer Basic Additions
DOS 3.3 Commands & Info
Color Selection Chart
Error Msgs & Handling
Reading Machine Language
Hex/Dec Conversion Chart
ASCII Chart Values, 80 Character
and 40 Character Graphics
APPLESOFT Tokens
Arrow & 6502 Red
4 Panels, 10 Pages
(For the Pro)
[illegible]
[illegible] Timing
[illegible] Language Stmt Table
[illegible] & Condition Code Branches

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5 Panels, 10 Pages
Operating Characteristics
Memory Types and Limitations
Modes of Operation
PRO Mode
RUN Mode
RESERVE Mode
DEF Mode
Fixed Variable Facts and
References
System Function Keys
Math and Logic Function Keys
Normal Character Keys
Special Characters and
Function Keys
Basic Commands
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Under The Rainbow

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You can play and interesting Adventure and prepare to learn how to create your own.

22 PLAYING AROUND WITH PLAY ..... Paul Penrose
Some of the more interesting aspects of this versatile command are explained and demonstrated.

24 MAKING FRIENDS WITH SAM ..... Alan J. Morgan
The secret of the SAM chip is revealed, with diagrams and more.

30 A MULTI-DISK INDEX ..... E. P. Rutledge
Now you can index one of your disks, or all of them—and even sort things out as well.

42 THERE IS NO ESCAPE FROM THIS SPACE DEBRIS ..... Jim Ebbert
Here is a game that, since you cannot win, you must simply try to survive. How long can you do it?

50 PICK THE WINNERS IN THE NFL ..... John Waclo
The second part of our series. This one explains how it is done and lets you review the 1981 season.

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COVER photograph by Jim Reed. Cake made and decorated by Charlotte Ford. Color Separations by Kelly Color Service

ADVENTURE CONTEST

NOTICE is hereby given that **the RAINBOW's** first annual Adventure Contest will be held in two divisions. All you have to do to win is to write an Adventure program, submit it to **the RAINBOW** and wait for the results.

A complete list of prizes will be published later. First prize in each division: $125 gift certificate from **Computer Plus** in the non-graphics division; $150 first prize from **JARB Software** in the graphics division. Other prizes from **Spectrum Projects, Prickley-Peor Software, Superior Graphic Software, Custom Software Engineering, Nonos Systems Corp.** and more. Deadline for entries is August 1, 1982. More details in next month's **RAINBOW.**

Non-graphics adventures must not use more than a title card and an end-of-game graphic. All entries become the property of **the RAINBOW** and none can be returned. By submitting an entry, author gives Falsoft Inc. the exclusive right to print, publish or otherwise use both program and author's name. Decision of the judges is final.

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The RAINBOW is published every month of the year.

LETTERS TO RAINBOW

SILENT ANSWER

Editor

One of the things I have been trying to do with my 80C is to interface it with a TI Silent 700 printer. I have finally been able to write a driver for this, and wanted to pass it along to anyone who might be trying to do the same thing.

The program is as follows:

```
110 DATA 52, 20, 214, 111, 193, 254
120 DATA 38, 11, 129, 13, 38, 7, 190
130 DATA 160, 2, 173, 3, 134, 10, 53
140 DATA 20, 57
150 FOR D=1000 TO 1021
160 READ E:POKE D,E:NEXT D
190 POKE 1021, PEEK(359)
200 POKE 1022, PEEK(360)
210 POKE 1023, PEEK(361)
220 POKE 359, 126:POKE 360,3:POKE 361,232
```

Using the table in the back of the *Getting Started* manual, you must then POKE the line delay (1), POKE the baud rate (300) and POKE the line width (82).

Bob Parkman
Riveria Beach, FL

HOW MUCH MEMORY?

Editor:

I own a 32K Color Computer and have a question about optimum memory usage. I want to read in files from my disk, assign memory space, and sort through them. My question is, how do I figure out the maximum number of files I can sort at once?

I've gotten as far as loading my program and figuring out how much free memory is left. But when it comes to dimensioning, I've been doing seat-of-the-pants clearing of memory until everything works out OK. But, if I wind up with several hundred files to compare, I'm going to have to know how close to the wire I can pack the memory, which means knowing exactly how much I need for each single record.

I enjoy your magazine very much and hope you, or someone, will be able to help me with this problem. The manual says only to "CLEAR 500 so that your computer will set aside plenty of space..." That's fine for some, but there are those of us who don't want to set aside "plenty of space" when just enough will do.

Duff Kennedy
Santa Barbara, CA

SECRET EDITING

Editor:

I would like to pass along something I learned by accident about the 80C.

When in the EDIT mode, if you press the letter key "A," that line will come back as if you never changed it at all. If you press the "E" letter key, the line will enter just as if you had pressed ENTER. If you press "Q," it will enter like an "E" but it will enter just as though the line was never corrected.

Brian Shroy
Salem, OR

(Editor's Note: These were reported in an earlier issue of *the RAINBOW*. In fact, all the editing subcommands available for the Model I/III are available for the 80C. They just are not all mentioned in the manuals.)

80C CLUBS

Editor:

For those in the Chicagoland area with Color Computers, the Northern Illinois Color Computer Club meets at the Des Plaines Public Library, 841 Graceland Ave., on the fourth Tuesday of each month at 7:30 p.m. 80C owners on all levels (beginners to advanced) are encouraged to attend. For further information, send a self-addressed, stamped envelope to me at 9346 Landings, Des Plaines, IL 60016.

John Bowman
Des Plaines, IL

Editor:

If there is anyone out there in the Kitchener-Waterloo, Ontario, area who is interested in our Color Computer User's Group, they are welcome to contact me at 500 Krug St., Kitchener, Ont., N2B 1L6.

Thanks very much and keep up the good work with *the RAINBOW*.

Peter Karwowski
Kitchener, Ont.

REVIEW NOTE

Editor:

Thank you for reviewing our LCA-47 in your June, '82 issue. We would like to make one correction: the LCA-47 does in fact work with Computerware's "16-Plus" board installed. The only problem noticed is one of physical space limitations. Both lower case adapters, ours and MSB's, experience the same squeeze. We know now that either unit can be installed 'over' the "16-Plus" board by using two 40-pin low-profile IC sockets sandwiched together to act as a riser to lift the lower case adapter above Computerware's board.

However, with the adapter stuck up so high, the cover of the RF shield will not fit back in place very well at all. We don't know for sure yet, but believe the same solution would be necessary for those using the Wolfbug EPROM adapter.

We would also like to let your readers know that we currently have three optional character generators available for the LCA-47: Japanese, Greek and Thinline Graphics and Electronics Symbols. More are in the works now and will be available soon for $25 each.

We also want to thank you for a great magazine. Each month it gets better. All the new format changes are great.

Roger Degler, Pres.
Micro Technical Products Inc.
Mesa, AZ

SOLVING DISK PROBLEMS

Editor:

I have been an avid reader/user of your magazine since its introduction and was delighted to see your announcement of the *Rainbow On Tape* program to avoid the frustrating and time-consuming task of entering the long programs through the keyboard.

When I got my Radio Shack disk up and running, I frequently got an I/O error when trying to access the disk to load or save programs. This was caused by the disk drive speed being improperly set. The drive speed can be checked and/or adjusted using the following procedure:

- Remove the dust cover (four screws).
- The drive pulley on the left hand side of the unit has two strobe bands on it. The inner band is 50Hz and the outer is 60Hz.
- Using a fluorescent lamp (60Hz), observe the outer band. If it appears to rotate in either direction when the drive unit is running, adjust the small bright yellow potentiometer below the pulley until the 60Hz band appears stationary. The drive speed will then be properly adjusted.

This procedure corrected my I/O problems and worked equally well for two of my friends with the same problem.

Sam R. Holland
Westland, MI

CLASSIFIED RAINBOW?

Editor:

I just received my first copy of *the RAINBOW* and was so pleased I am enclosing a check for all the back issues. I will re-subscribe when the time comes.

Have you considered a classified section for your fine magazine? Like swaps, things for sale, 80C Clubs and so forth?

Bob Smith
Bellflower, CA

(Editor's Note: We really have not thought too much about a classified section, although we could certainly add one if you, the readers, want same. We would not support any advertising for "swaps" of software (and we're sure that is not what Mr. Smith is really interested in). Too, all 80C Clubs can get free mention in the Letters column. But, if you want such a service, we will be pleased to provide it.)

CONVERTING PROGRAMS

Editor:

I would like to see an article on converting Model I/III programs to run on the Color Computer. What do you do with DEFINT commands, for instance?

I enjoyed the *3D MAZE* and want to know more about the "frontier cell" system used.

Douglas MacRae, M.D.
Orange, CT

(EDITOR's NOTE: Spectral Associates has a fine program called *MAGIC BOX* which will convert Model I/III programs to the 80C. There are some commands, however, which cannot be converted and DEFINT is one of them. The PEEKs and POKEs are different as well. Also, see the review of David Lein's book in this month's issue.)

TECHNICAL COMMENTS

Editor:

As requested in your *Letters* column, I wish to add my voice to those who request you devote more space to subscribers who are not technically involved or knowledgable about programming the Color Computer. I would like to see more beginners' information and tutorials like the one just started in The Assembly Corner.

Hartin Hoffman
San Leandro, CA

Editor:

I especially like Dennis Lewandowski's Assembly Corner and look forward to future articles. If you have any information or know of any books for teaching second or third graders BASIC, I would appreciate hearing from you. So would my kids.

Douglas McLaughlin
Oxnard, CA

(EDITOR'S NOTE: Radio Shack's Color Computer Learning Lab was designed to teach BASIC. While it may be a bit advanced for your children, you should take a look at it.)

Editor:

I am usually not much into writing letters, but this Color Computer has really gotten to me and I am now completely addicted and find myself sending my VISA number all over North America to feed this addiction.

First of all, your magazine is superb and I am frankly on tenterhooks each month waiting for the next edition. The main purpose of this letter is to congratulate you and to put in my vote for Tom Nee, Glenn Knight and Jim Rauh (on the question of simple explainations).

One other thing I would like to mention which I have not seen noted in any magazine is that, when I put in a long program through the keyboard my computer sometimes hangs up and I would lose both the cursor and the program. A few quick telephone calls around town revealed a similar problem and a quick cure with the installation of a heat dispenser (home made).

D. Henderson
Huntsville, Ont.

(EDITOR'S NOTE: Dick White of Cincinnati suggests one way to keep heat down in the 80C is to paint the inside of the RF shield black.)

Editor:

I am very pleased to see the Assembly Corner. You are doing yourself proud and we subscribers may collectively thumb our noses at Mr. Green. Keep up the good work.

No offense to Mssrs. Scerbo and Haggerty (I think their graphics are great!) but it is nice to see a non-shootem-up game like *3D MAZE* in your pages.

Steven Koppel
Montclair, NJ

YOUR WISH IS. . .

Editor:

May I offer these suggestions for your excellent magazine?

1. Put a Table of Contents in each issue. We can do without an index of advertisers right now, the ads are not that hard to find but the articles are more difficult to locate.

2. Disclose the printer and type style used for articles. This would allow those of us with little other exposure to determine which are compatable with the 80C and to evaluate what you are using.

3. For those of us in Canada, please use a full size envelope instead of folding *the RAINBOW* in half.

Robert Taylor
St. John's, NFLD

(EDITOR'S NOTE: We went to the Table of Contents just about the time Mr. Taylor's letter came in, but we'll keep the advertiser's index, too. Anything that helps you find your way through the pages can only be a bonus. As to printers, we use both a Radio Shack LP VIII and an Epson MX-80 with Graftrax. Earlier editions were printed on a LP VII. Now, of course, we are using type, but the listings come from the LP VIII and the MX-80, primarily the Radio Shack printer. As to the enevelopes, we are now using full-size for all non-U.S. deliveries. There are two reasons—one of them as expressed by Mr. Taylor, the other because *the RAINBOW* got too big to fold. Would anyone like to buy several thousand small (5x7) envelopes?)

MORE ON ENVELOPES

Editor:

Here is a listing of a little extra on the envelope program from the April issue. When you are going to write a letter, it should be run in first. Then, all you have to do is compose the body of the letter.

```
10 FOR X=1 TO 26:PRINT#-2:NEXT
20 PRINT#—2,"EDWARD J. DONOVAN"
30 PRINT#—2,"357 JUNE ST."
40 PRINT#—2,"WORCESTER, MA 01602"
50 FOR X=1 TO 4:PRINT#-2:NEXT
60 LINEINPUT "NAME ";A$
70 LINEINPUT "STREET ADDRESS ";B$
80 LINEINPUT "CITY, STATE, ZIP ";C$
90 PRINT#-2,TAB(35)A$: PRINT#-2,TAB(35)B$: PRINT#-2,TAB(35)C$
100 FOR X=1 TO 33:PRINT#-2:NEXT
103 LINEINPUT"DATE ";D$
105 PRINT#-2,D$
107 FOR X=1 TO 4:PRINT#-2:NEXT
110 PRINT#-2,A$
120 PRINT#-2,B$
130 PRINT#-2,C$
140 FOR X=1 TO 4:PRINT #-2:NEXT
150 LINEINPUT "NAME ";S$
160 PRINT#-2,"DEAR ";S$
170 FOR X=1 TO 2:PRINT#-2:NEXT
1000 FOR X=1 TO 3:PRINT#-2:NEXT
1010 PRINT#-2,TAB(71)"REGARDS,"
1020 FOR X=1 TO 3:PRINT#-2:NEXT
1030 PRINT#-2,TAB(60)"EDWARD J. DONNOVAN"
1040 PRINT#-2,TAB(60) "357 JUNE ST."
1050 PRINT#-2,TAB(60) "WORC ESTER, MA 01602"
```

Edward J. Donovan
Worcester, MA

KUDOS

Editor:

Thank you for making available such a super magazine for us CC hackers. I really look forward to each issue.

W. D. Connor
Chicago, IL

PRAISE FOR CARDS

Editor:

I wanted to write a short note to tell you and your readers how impressed I am with the Nanos Systems Corp. program cards for the 80C. This card is a most helpful and useful product.

Although I am "in the business," I really do not think it inappropriate for me to comment in this way when there is a truly outstanding product available. The Nanos card is such a product.

I hope you will publish this letter so that others may be aware of the quality of this fine product for the Color Computer (and, incidentally, for other computers as well).

Joseph Bennett
JARB Software
Imperial Beach, CA

SPELL 'N FIX

Finally Available for the Color Computer!

Now produce goof-proof text on your Color Computer by letting SPELL 'N FIX find and correct your spelling and typing mistakes. Used since 1981 on larger 6800 and 6809 systems, SPELL 'N FIX is now available for your Color Computer too.

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* Dictionary can be expanded and customized — technical and even foreign words are easily added.
* Available for the Radio Shack disc, cassette, or Flex disk operating system.
* Compatible with all Color Computer Text Processors, including TeleWriter!

SPELL 'N FIX is available off-the-shelf right NOW, and costs $69.29 in the Radio Shack disk or cassette versions (32K RAM required!); $89.29 in the Flex version. (Other versions, including Percom DOS, SSB DOS, and OS-9 versions also available — contact us.)

HUMBUG

Now in a Color Computer Version

HUMBUG is the famous SUPER MONITOR for 6800 and 6809 systems — you can now use it on your Color Computer too.

HUMBUG is a complete machine language monitor and debugging system which allows access to the full power of the 6809E processor in the computer. HUMBUG lets you

* Input programs and data into memory.
* Output and list memory contents in various formats.
* Insert multiple breakpoints into programs.
* Single-step through machine language programs.
* Test, checksum, and compare memory contents.
* Find data in memory.
* Start and stop programs.
* Upload and download from bigger systems, save to tape.
* Connect the Color Computer to a terminal, printer, or remote computer.
* Learn how the Color Computer works by studying the listing of HUMBUG in the complete manual.

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REMOTERM — allows full operation of the Color Computer from an external terminal. $19.95.
LFPRINT — permits the Color Computer to be used with non-standard serial printers which do not support handshaking or automatic line feeds. $19.95.
NEWTALK — a memory examine utility for machine language programmers which reads out memory contents through the TV set speaker. $20.
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Editor's Notes...

PRINT #—2,

Well, it should be apparent just from seeing where this column is—and from looking at the cover of this month's issue—that there have been some changes made in *the RAINBOW* !

We hope that you like what you see. From now on, you can expect to see type rather than dot-matrix copy in *the RAINBOW*. (Of course, our program listings will continue to be in printout form. That makes it possible for us to insure, as much as possible, that they are correct and free from error. We won't be resetting them.)

We hope this will make your favorite computer magazine more easy to read and use. And we hope you enjoy the other innovations you see this month, too—color, the cover and the little goodies here and there. Please let us know your reaction to all of this.

* * * * * *

For those of you with an interest in this sort of thing, *the RAINBOW* is set in a typeface called Times Roman in 10 point type, leaded out one-half point. We believe a serif typeface like Times Roman (serifs are those little squiggles on the letters) are easier for you to read. The size and leading (space between the lines) is considered good for reading and comprehension.

And, by the way, type allows us to get something like twice as many words onto a page as does our dot-matrix printer. So, while it may appear that the articles are shorter, actually they are longer and there are more of them. We believe you will consider this a valuable bonus to our new look.

* * * * * *

It's really hard to believe that *the RAINBOW* started just a year ago with two pages of copy that was photocopied on two sides at the local drug store. We made 25 copies (but had to go back and "reprint" 10 more). Today, paid circulation is over 5,500 and really growing. And it would not have been possible without the help of a whole lot of people — especially including the 5,000-plus of you who buy *the RAINBOW* every month.

Still, there have been a whole lot of people who helped us get started on this and we'd like to mention a few of them. We know this is, basically, information of less than profound interest. But, we honestly wouldn't be able to bring you the kind of magazine we are now doing without their help. I hope you'll pardon my using this space to thank some of them.

In the beginning there was Joe Bennett of JARB Software, my first "computer" friend. Joe sent us our first outside program, and our first program for review. That was JARBCODE — which we printed in full a couple of months ago.

Our first ad came from Bob Lenz and Ann Curtis at The Micro Works. They're back again. What they really gave us in the early days was some support. A real ad! And at the time that first ad appeared, we only had 70 subscribers. There wasn't much return for them, then.

Dave Laugerquist and Robin Sager at Chromasette—along with Vic Andrews of Soft Sector Marketing—gave us our first real encouragement and our first suggestions. Dave, you were right, we *did* grow. A phone call from Vic is always welcome for his excellent advice.

Disney's Electronics in San Diego, our first retail outlet had some confidence in us. There are some 40 stores which carry *the RAINBOW* now.

All of our columnists: Jorge Mir, Bill Nolen of Prickley-Pear, Dennis Lewandowski of DSL, John Urban of JARB, and, now, Steve Blyn of Computer Island. These people meet some hard deadlines assigned by our absolute commitment to get this magazine out on time each month. Its not easy for them. Steve, by the way, will be writing about educational issues and providing programs in his new column. We hope you will join us in welcoming him.

Who but Bob Rosen could do so much for so many? His Connection-80 is a real boon to all of us 80C users and his support, encouragement and good humor have really helped us make it through the year. Bob is one of the reasons that the Color Computer is the successful product it is.

Paul Nanos of Nanos Systems, Ron Krebs of Mark Data, Sue Searby of Computerware, Greg Wilson of Potts Point, John Waclo of Elite, Al Morgan of Peacock, Arnold Pouch of Superior Graphic, Wayne Diercks of Rainbow Connection, Jay Hoggins of Harmonyes, Tom Rosenbaum of Spectral, Gary and Susan Davis of Sugar, Dick White, Oscar Millican, Tom Kelly and a whole host of other people have made significant contributions to making this magazine what it has become. I'd like to thank you publically.

And Fred Scerbo of IMB. Not only has he contributed a wealth of software for your free use, but he has given a great deal of encouragement. Similarly Bill Dye of Trans Tech, who's been a valuable source of help and assistance a whole bunch of times.

The RAINBOW, and all of you who deal with it in any way, have been super fortunate to have Pat Hirsch as our office manager. If you got your subscription, back issues,

See PRINT—Page 8

TRANS TEK

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C. C. Writer

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PRINT—From Page 7

and so forth when you should and as you should, it was because of Pat, and not me.

Then, there are the other members of the "staff," Willo Falk, Wendy Falk and Laurie Falk. They tested programs, pitched in to get things mailed, put up with bad moods (who, me?) and late, late hours. They even brought food to me when I was in the midst of a layout session. The rumor that *the RAINBOW* runs on Pepsi-Cola and pizza is not without its foundations in fact.

Others, too, have been a big help. L.K., the magnate and counsel, has been a strong right arm and has given much to this effort. Such as Chris Washington, our (and his) secretary.

The list, frankly, is endless, and I know I have left a bunch of people out. I'm sorry, because there have been, literally, hundreds of you who have worked and helped to make *the RAINBOW* a success this year. We intend for it to be a success next year, too. But not without your help.

The first edition of *the RAINBOW* said that we would try to produce a good magazine, come out on time every month and provide some support for the Color Computer. I hope we have been able to do that in such a way as to meet your hopes and expectations. The people at Radio Shack, Jon Shirley and his crew, have given us an excellent machine and can be proud of their work.

I hope we have done them proud by giving you a good magazine every month. We'll try to keep it up.

—Lonnie Falk

Software Review...

These Programs One Of Biggest Bargains Going

I honestly believe that the three program-package offered by Century Software for $8 is one of the biggest bargains in the 80C world today.

Actually, I don't know why I say three programs, because there are four in all in this package. But one of them is touted as a "free" program.

Don't let the price fool you. And, if you do send your eight bucks to Century, don't expect super-duper packaging and documentation. But, these programs are quite good (by 15-year-old Tim Hansen) and give a wide variety of experience with what can he done with some imagination.

The games included in this package are *LEM*, which really should be called "Lunar Shuttle;" *Pirate Adventure*; *Superzap*; and, for free, *Darts*.

LEM is your basic Lunar Lander, except in this case the LEM takes off from the moon's surface and then has to be put back down before the fuel runs out. It has some good graphics and good response. We wish we had had a little more fuel, as it is somewhat difficult to land successfully (but, then, we've never been very good at these).

I really liked *Pirate Adventure*. It is fast-moving, not without its secrets, and can foil you quite easily. In many ways, it is a perfect program to get someone interested in adventures.

Superzap puts you in the middle of the screen and has rockets coming at you from all four sides (sometimes all at once). The object, obviously, is to wheel around and shot them before they shoot you. Although a tad static, it can heat up quite rapidly and is a good game for younger children.

And, for free, there is *Darts*. Its a good adaptation of the old moving target game.

While you cannot expect super graphics and the like at this price, I recommend this package most highly to give you a taste of your 80C.

(Century Software, 1649 Geneva Ave. No., St. Paul, MN 55119, $8)

Utility...

Let's Go On A Simple Rainbow Adventure

32K ECB

By Jorge Mir
Rainbow Utilityman

We're going to do things a little differently this month, but there is a good reason for it. The listing which appears at the end of this program is called *RAINBOW ADVENTURE* and, as such, it has no real relationship to the comments I will make here.

In other words, it is a complete program all to itself. Just load it and RUN it and you'll (I hope) have a fairly simple, but enjoyable, adventure.

What I am going to talk about this month is writing an adventure. And, next month, we will be giving you an outline of an adventure generator that will help you write your own adventures. It is a sort of help for those who will be entering *the RAINBOW's* Adventure Contest.

Save this listing. We'll show you next month how we plugged in the variables. By comparing the *RAINBOW ADVENTURE* this month with next month's generator, it will be pretty easy to see how to plug in your own variables. And, it should give you an idea as to one possible way to structure an adventure.

The most difficult part of writing an adventure is getting started. This article will cover some simple tips which might help you get your feet wet in this fascinating type of programming.

First of all, make your first adventure a simple one. Don't try to design another *CALIXTO ISLAND* or you will surely be disappointed. Just have a few rooms, objects and verbs in your first attempt at an adventure.

Your next step should be to write down the entire adventure (or most of it) on paper. By now you probably own one of the various word processor programs available commercially for the 80C. Or, you may have developed your own. Whichever is the case, sit down at the computer and start typing out the adventure in story format (a regular typewriter will do, too). This should help you organize your thoughts as to what you want your adventure to look like.

Once you have developed the story, start a list of key items to be included in the adventure. Key items are the most important part of the adventure which you want to be sure take place when the adventurer is playing.

For example, what must happen before entrance is available to certain rooms? What objects will appear—or what will they do—when the adventurer moves, drops, opens, shakes or otherwise manipulates them? What are the conditions that will cause the adventure to end or the adventurer to be killed? What things must be accomplished before the adventurer can "win" the game?

Having the adventure in story format and the key items identified will make the next steps a lot easier.

Let's start "laying out" the adventure by getting a large sheet of paper and drawing a lot of little boxes on it. These boxes will represent the "rooms" in your adventure. Draw each box big enough so that you can write the following things inside:

1. A room number for identification purposes.
2. The description of the room.
3. The objects which appear when you first enter the room.
4. Any other notes to remind you what is to happen in each of the rooms.

Make a list of the rooms you have included in the adventure and number each room consecutively, starting with number one. Also, make a list of objects noted above and add to the list additional objects which will not appear automatically in any one room, but will appear as the adventure develops. Number these objects consecutively, also starting with number one.

You will then need to decide which verbs you will have available in your adventure. Jot all of the verbs down that you think you might need. Don't worry if you miss some verbs, since there is always plenty of opportunity to add new ones as you develop your adventure.

In order to increase the vocabulary of verbs, make a list of verbs similar to those already selected and identify them with their equivalent verbs. For example, "take" could be made to produce the same effect as "get." Other examples and their equivalent verbs might be look/examine, lift/pick, drop/leave, put/place, end/quit, and so forth.

With all rooms identified, you then need to determine how they are connected to each other. Since you have drawn the rooms (boxes, that is) on a piece of paper, this should be simple. Make the top of each box "north," the bottom "south," the left side "west" and the right side "east."

Now, draw lines between rooms in such a way so that you can readily tell in which direction you must travel in order to enter the next room. If you decide to include "up" and "down," as additional directions the adventurer can travel, draw boxes using colored pencils to help you identify such directions (for example, blue boxes for "up" and red ones for "down").

You will probably want to have some rooms which cannot be accessed until something happens first, in which case additional exits would then be made known to the adventurer. Draw dotted lines between these rooms to indicate the exits that will appear later on as the adventure progresses.

One aspect that is usually welcomed by many adventurers are the hints given when "help" is entered as a command. If you want to include this type feature in your adventure, make a list of the various responses to the "help" command. Each of the responses should be identified by room number so that an appropriate response can be recalled according to the room location.

At this point, it would be easy to start programming the adventure. Rather than starting from scratch, wouldn't it be nice to get hold of a standard type program for adventures? Well, *ADVMAKER* is just such a program and, as I mentioned earlier, it will appear—with appropriate instructions—in the August issue of *the RAINBOW*.

Meanwhile, enjoy *RAINBOW ADVENTURE* and plan your own opus for fun or the big contest!

The listing:

```
1 ' **** RAINBOW ADVENTURE *****
10 CLEAR 1000
20 CLS
```

See ADVENTURE—Page 11

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ADVENTURE—From Page 9

```
30 DIM RM$(85),OB$(85),OB(85),D(
85,6),D$(6),F(10):MX=5:CA=0
40 FOR X=1TO6:READ D$(X):NEXTX
50 X=0
60 X=X+1:READ RM$(X):IF RM$(X)="
END" THEN 80
70 FOR Y=1TO6:READ D(X,Y):NEXTY:
GOTO60
80 X=0
90 X=X+1:READ OB$(X):IF OB$(X)="
END"THEN NO=X-1:GOTO100:ELSE REA
D I$,OB(X):OB$=OB$+I$:GOTO90
100 X=0
110 X=X+1:READ I$:IF I$="END" TH
EN 120 ELSE VB$=VB$+LEFT$(I$,3):
GOTO110
120 CLS
130 YOU=1
140 PRINT"I AM ";
150 PRINT RM$(YOU)
160 PRINT"I CAN SEE: ":F=0
170 FOR I=1 TO NO
180 IF INT(OB(I))<>INT(YOU) THEN
 200
190 PRINT "  "OB$(I):F=1
200 NEXT:IF F=0 THEN PRINT"  NOT
HING INTERESTING"
210 PRINT"YOU CAN GO: "
220 FOR I=1TO6
230 IF D(YOU,I)<>0 THEN PRINT" *
" D$(I);
240 NEXT
250 PRINT
260 PRINT STRING$(32,61);
270 INPUT"WHAT SHOULD I DO";I$
280 IF I$=""THEN270 ELSE IF I$="
LOOK" THEN CLS:GOTO140
282 IF I$="QUIT" THEN END
284 IF I$="SAVE" THEN 7010
286 IF I$="LOAD" THEN 7070
290 IF LEFT$(I$,2)="GO" THEN PRI
NT"USE SINGLE LETTERS TO INDICAT
E  DIRECTION (EXAMPLE, N=NORTH)"
:GOTO260
300 IF LEFT$(I$,3)<>"INV"THEN 36
0
310 PRINT"I AM CARRYING:":F=0
320 FOR I=1TO NO
330 IF OB(I)=-1THEN PRINT OB$(I)
:F=1
340 NEXT:IF F=0 THEN PRINT"NOTHI
NG"
350 GOTO 260
360 IF LEFT$(I$,5)<>"SCORE"THEN
430
370 T=0:Y=0
380 FOR I=1 TO NO
390 FOR L=1TO LEN(OB$(I))
400 IF MID$(OB$(I),L,1)="*"THEN
T=T+1:IF OB(I)=YOU OR OB(I)=-1TH
EN Y=Y+1
410 NEXT:NEXT
420 PRINT"OUT OF";T;"POINTS YOU
HAVE";Y:GOTO 260
430 IF LEN(I$)=1 THEN 710
440 IF I$="HELP" THEN 800
450 SP=INSTR(I$,CHR$(32)):IF SP=
0 THEN PRINT"TRY USING TWO WORD
COMMANDS.":GOTO260
460 V$=LEFT$(I$,SP-1):O$=MID$(I$
,SP+1)
470 A$=LEFT$(V$,3):B$=LEFT$(O$,3
)
500 IF A$="TAK" THEN A$="GET"
501 IF A$="LEA" THEN A$="DRO"
502 IF A$="LOO" THEN A$="EXA"
503 IF A$="MOV" THEN A$="PUS"
504 IF A$="TEA" THEN A$="BRE"
600 V=(INSTR(VB$,A$)+2)/3:IF V<1
 THEN CLS:PRINT"SORRY, I JUST DO
N'T KNOW HOW TO":PRINT V$" ANYTH
ING.":GOTO 140
610 O=(INSTR(OB$,B$)+2)/3:IF O<1
 THEN CLS:PRINT"SORRY, I JUST DO
N'T SEE ANY ":PRINT O$" HERE.":G
OTO140
700 IF LEN(I$)>1 THEN 1000
710 V=0:CLS:IF I$="N"AND D(YOU,1
)<>0 THEN YOU=D(YOU,1):GOTO 140
```

See ADVENTURE—Page 13


```
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ADVENTURE—from Page 11

```
720 IF I$="S"AND D(YOU,2)<>0 THE
N YOU=D(YOU,2):GOTO 140
730 IF I$="E"AND D(YOU,3)<>0 THE
N YOU=D(YOU,3):GOTO 140
740 IF I$="W"AND D(YOU,4)<>0 THE
N YOU=D(YOU,4):GOTO 140
750 IF I$="U"AND D(YOU,5)<>0 THE
N YOU=D(YOU,5):GOTO 140
760 IF I$="D"AND D(YOU,6)<>0 THE
N YOU=D(YOU,6):GOTO 140
770 GOTO 1000
800 '*************************
810 '****** HELP SECTION ******
820 '*************************
825 H=H+1
826 REM Only allow 5 hints
830 IF H=>6 THEN PRINT"THAT'S EN
OUGH HELP FOR NOW. YOU ARE SUPPO
SED TO USE YOUR BRAIN, NOT ASK F
OR HELP EVERY TIME YOU ARE IN TR
OUBLE.":GOTO260
840 IF YOU=4 OR YOU=6 THEN PRINT
"I'M PUZZLED TOO!":GOTO260
850 IF YOU=2 AND F(3)=1 THEN PRI
NT"MAYBE YOU NEED SOME MONEY.":G
OTO260
855 IF YOU=2 AND F(3)=0 THEN PRI
NT"THE BUS COMPANY HAS DISCONTIN
UEDTHEIR BUS SERVICE TO THIS ARE
A.":GOTO260
860 IF YOU=9 THEN PRINT"YOU BETT
ER LEARN HOW TO RUN THE COLOR CO
MPUTER.":GOTO260
870 IF YOU=10 THEN PRINT"LOOK IN
 THE MIRROR.":GOTO260
880 PRINT"TOUGH LUCK!  JUST KEEP
 TRYING!":GOTO260
1000 F=0:IF OB(0)=YOU THEN F=1 E
LSE IF OB(0)=-1 THEN F=2
1002 ON V GOTO 1100,1200,1300,14
00,1500,1600,1700,1800,1900,2000
,2100,2200
1010 IF LEN(I$)=1 THENPRINT"I CA
N'T GO THAT WAY!":GOTO 140
1020 PRINT"I DON'T UNDERSTAND WH
AT YOU ARE TELLING ME.":GOTO260
1100 '*** GET ***
1102 IF F=2 THEN PRINT"I ALREADY
 HAVE IT!":GOTO260
1104 IF F=0 THEN PRINT"I DON'T S
EE THAT HERE.":GOTO260
1106 IF CA=>MX THEN PRINT"I CAN'
T CARRY ANYTHING ELSE!":GOTO260
1110 REM Don't allow objects to
be picked up.
1120 IF O=1 OR O=2 OR O=5  THEN
PRINT"DON'T BE RIDICULOUS!":GOTO
260
```

See ADVENTURE—Page 15

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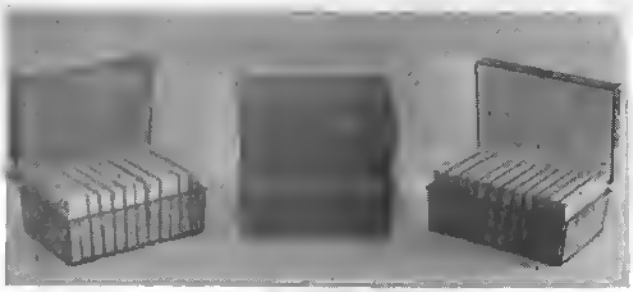

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COLOR COMPUTER DISK SYSTEM

We offer a complete disk drive interface system for the color computer, featuring the Tell Grass Technologies Double Density, buffered disk controller card. The disk interface board plugs into the color computer expansion socket and provides for doubling the storage capacity of single density type disk drives by using GCR encoding / decoding techniques. Power may be taken internally from the system or from an external power supply (not normally required even with piggyback 4116's installed). This controller will support up to 4 single/double density, single/double sided 5 & 1/4 inch disk drives. These include Shugart 400 series, Siemens 82, TEAC 50 series, Partec FD200, MPI B51/52/91/92, Tandon and others. The controller uses standard 10 sector diskettes and does not read or write the soft-sectored IBM style formats used by TRS-80 or FLEX systems. Two reasons for not using a soft sectored system are cost and reliability.

The Tallgrass double density format offers more margin for worn diskettes, dirt etc. and less expensive single density disk drives & diskettes. All you need to add to have a complete disk system is a disk drive / cable.

DISK OPERATING SYSTEM (DOS)

The Disk Operating System for the Tallgrass Technologies Disk controller (CCMD+9) is a full featured "BASIC" compatible operating system. It is fully integrated with the ROM basic system already in the color computer and automatically is initialized upon system power on much the same as the R.S. disk system does. But there is a big difference between that disk system and CCMD+9. First of all we support any mix of 35, 40 or 80 track single or double sided disk drives, which allows a minimum of 4 times the storage capacity of the "other" disk system. We also make far better use of the disk storage space by using sector allocation for each file instead of the granual method of 8 sector blocks which can waste anywhere from 1 to 7 sectors for each file on the disk. For example, on their DOS, if 5 files each required only 2 sectors there would be 40 disk sectors allocated, a waste of 30 disk sectors or almost 4 "granuals". This is not the case in our disk system, only the required number of sectors would be used.

Many other disk systems using a sector allocation system have a problem with file fragmentation and excessive seek time after a disk is used over and over adding and deleting files until it becomes so bad that the disk must be re-formatted to correct the problem. With CCMD+9 this is not the case, as files are deleted the disk space is automatically repacked to help keep files from being fragmented and decrease access time.

The DOS is contained in a ROM on the disk controller the same as the R.S. disk system so you don't have to "bootstrap" the DOS off of a disk and it doesn't get clobbered easily by a runaway program as most ram based systems do. The DOS does "NOT" require Extended Basic and will run on a 4, 16 or 32K system without any modifications. CCMD+9 uses approximately 1K of ram for the disk system which is taken from the top of memory, this allows all previously purchased tape software to function with the disk system, this is not so with the R.S. disk system.

CCMD+9 supports both Basic and Machine language programs. It is easily accessible to the beginner or advanced machine language programmer with easy to use and well documented entry points to perform disk as well as screen/printer/keyboard input & output. It includes 19 disk file functions to open, close, read/write random or sequential files, read specific sector of file, flush sector buffer to file, close & rewind file (re-open) and process disk system errors. The screen/printer/keyboard I/O functions include: input character, output character, output text string, output carriage return, output 2/4 hex characters, output space character and read/write single disk sector.

The "BASIC" interface system allows Basic and Basic programs to communicate with the disk system much the same as the R.S. disk system does with a few added features. It includes both Direct and Indirect basic commands. Direct commands can be executed any time and Indirect commands are contained with "Basic" programs. The Direct commands include, LOAD or SAVE (binary/ASCII basic program disk file), CHAIN (load & execute basic program) and CDOS "disk command". The "CDOS command allows you to execute a specific disk command from the free standing disk system, these include: LOAD/SAVE machine language or memory file, REMOVE one or more disk files, CHANGE disk file name, CHECK disk file for errors, ANALYZE disk directory, STRACK set tracks & sides for disk drive, SCMP set compare on/off, RUN load & execute machine language disk program, GOTO execute machine language program at specified address, and NEW initialize disk. If the "CDOS" command is executed without any command following control is passed to CCMD+9 where any of the previously mentioned commands can be executed directly thus providing total control of the entire system. The command system is easy to learn and remember with a minimum of effort on the users part. The BASIC interface system was designed to be compatible with the existing I/O commands used with tape files for easy conversion and upgrading to disk. When using Basic disk files up to 9 files can be active at once with all disk file memory allocation being done automatically at run time, you don't have to reserve file space as with the R.S. disk system. The indirect basic commands include: Open, Print, Input, Line Input (ext. Basic), EOF, Rewind, Close, Print Using (Ext. Basic). These all function in the same manner as basic tape file I/O.

CCMD+9 has one other unique feature not found in most disk systems. Each disk initialized by the system is assigned a disk label which can be used instead of a disk drive number, the system will automatically locate which drive the diskette is on and use it accordingly. This can be very useful in basic programs which use files on multiple disks, you don't have to worry which disk belongs in which drive.

Part of the power and flexibility of CCMD+9 lies in the Disk Utility System which allows the system commands to be greatly expanded by adding utility or transient disk commands. These commands are automatically handled by the system so as not to overwrite Basic programs in memory and can even be called by a Basic program in some cases. For example you can perform a disk copy or backup while still preserving a basic program currently in memory, no other system that we know of has this ability. We currently have a list of utilities available and will be adding to it constantly to improve the system.

SOFTWARE SUPPORT

This disk system is the most recent one to enter the color computer disk market and is currently the only one with any disk software to support it. There should be no problem in the future with a lack of software for this system because, it is extremely easy to interface software to. We currently have available for the disk system; a Disk Assembler which allows files larger than memory to be assembled, a Disk Text Editor which makes writing Basic and Assembler programs easy and also will edit files larger than memory, a Disk Text Editor/Processor (WORD PROCESSOR) "TEXTPRO1 which is easy to learn and extremely powerful for its price range, TEXTPRO II is an advanced version with expanded features: programmable tabs, 3 line processable headers, decimal/center/right justify/ horizontal taos. keyboard input processing and more. A Disk Disassembler/Source generator, a Disk system monitor which includes all of the "TRSMON" monitor commands & has access to all of CCMD+9 disk commands & automatically locates itself at the top of memory to stay out of the way, and a full compliment of disk utilities. The utility disk includes: full disk backup, build disk text file from keyboard, 24 hour screen clock, single or multiple disk file copy, text file executive processor, ASCII/HEX file dump/list/map utility, ASCII file lister/printer, and a disk relabel utility. All at prices far below what other disk system software sells for.

TG-99 Disk Controller w/CCMD+9 DOS ROM	**$159.95**
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CCEDT9 Disk Text Editor	**$ 24.95**
CCDIS9 Disk Disassembler Source Generator	**$ 29.95**
CCTPR1 Disk Text Editor/Word Processor TEXTPRO 1	**$ 39.95**
CCTPR2 Disk Text Editor/Word Processor TEXTPRO 2	**$ 59.95**
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SPECIAL LIMITED OFFER

We have a complete disk system package available that includes a 40 track single sided disk drive with power supply, case, 2 drive cable, TG-99 controller w/CCMD+9 and a disk containing CCUTLY disk utilities and CCEDT9 disk editor all assembled and tested for $499.00

Additional 40 track drive with power supply & case tested $300.00

For double sided drives add $100.00 per drive. Add $5.00 per drive for shipping, NO COD's on disk drives or disk system special. Shipping for disk controller add $2.50, for Disk software only add $1.00. Visa & M/C add 3% (this is what the bank charges us)

Manufactured under license from Tall Grass Technologies.

CO RESIDENT EDITOR/ASSEMBLER

Co-resident Editor/Assembler that will allow the user to create, edit and assemble machine language programs for the color computer. The editor portion of the program is similar to the text editor in TEXTPRO. The assembler will output machine object code to either cassette tape in a 'CLOADM' readable format or directly to memory for direct execution. The assembly listing can optionally be output to the printer connected to the RS-232/Printer port on the color computer. All errors are displayed with a full text message for easy identification. The assembler supports the full compliment of the M6800 instruction set and also will cross assemble 6800 source code to produce M6809 compatible object code.

CO-RES9 **$38.95**

SYSTEM MONITOR

TRSMON is a 2K system monitor program that will allow you to explore the workings of the color computer. It features 9 debugging commands, tape load and save compatible with Basic "CLOADM", up/down load via RS232 port, terminal package that allows the color computer to be used as a terminal at baud rates up to 9600 baud and a printer driver to direct display output to the printer for memory dumps, disassemblies etc. The program is position independent so it can be moved anywhere within the system memory. A very powerful tool at a very reasonable price. Commands include:

Memory examine & change, Goto defined address, Load Tape program (w/offset), Load Motorola S1-S9 file (RS232), Save Tape program, Send memory file S1-S9 (RS232), Set and/or display breakpoints, Remove one or all breakpoints, Define printer/terminal baud rate, Set and/or display registers, Dump memory in Hex & Ascii format, Disassemble memory file, Terminal mode & optional buffer, Fill memory, Move block of memory, Find memory byte sequence, Exit monitor to Basic, Exit monitor to Rom Pack ($C000), Re-initialize monitor, Direct output to printer.

TRSMON ON TAPE **$18.95**

TRSMON on 2716 Eprom **$34.95**

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TEXTPRO
TEXT EDITOR/PROCESSOR

TEXTPRO is a complete text editor & text processing program for the Color Computer. The program includes our powerful full function text editor plus the added features of a text processor. The entire program utilizes only 6K of memory space including the tape, screen and keyboard buffers. It is extremely fast in editing and processing text files and is compatible with Basic ASCII formatted tape files.

The Editor itself includes 24 commands including string search & replace, line and automatic line edit modes which allow you to insert, delete, change or add characters. Automatic line editing allows you to skip forward and backward for checking and editing, all screen editing immediately updates the screen so you know exactly what you are doing at all times. The Editor also has commands to move or copy single lines or blocks of text from one place to another. Some of the other commands include Tape load, save and append; Automatic line numbers, delete line, set input line length and printer output.

The Text Processor includes 29 commands for formating the output, some of them include: page length, left margin, top & bottom margin, line length, justify & fill modes, page heading, center line, double width print, margin control, single, multiple & special indent modes, test lines left on page, display & input from keyboard and even special control codes can be sent to the printer for different print densities etc. It even has a repeat command with a next command to redo all of or a portion of the file as many times as needed. TEXTPRO will turn your color computer into a full fledged text processing machine at a price you won't believe. Available on 'CLOADM' compatible cassette.

SPECIAL INTRODUCTORY PRICE $29.95

RS. DISK VERSION $49.99

DATAPACK
DATA COMMUNICATIONS PACKAGE

DATAPACK is a Terminal package program for the COLOR COMPUTER, allowing you to use the color computer as a buffered computer terminal through a modem to a time sharing network or as a direct connect terminal to another computer system at rates up to 9600 baud. This program is more than a standard "Videotext" type program in that it will allow you to save data stored in the buffer either to cassette tape, or output a hard copy to a printer. The data buffer is automatically set to the maximum size of your system memory when entered to allow maximum space for saving data. The program includes features to send control codes and to enable or disable keyboard echo. When the terminal mode is exited the contents of the buffer may be viewed on the screen or saved to tape for later loading. Also the RS-232 port can be used to plug your printer back in for sending the screen buffer to the printer. An additional feature is the ASCII format that is used on tape is compatible with the CER-COMP Text Editor program and BASIC, enabling you to edit or delete unwanted information.

PRICE: $24.95 ON CASSETTE

RS. DISK VERSION $40.95

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ADVENTURE—From Page 13

```
1199 OB(O)=-1:PRINT"OK, I GOT IT
."":CA=CA+1:GOTO260
1200 '*** DROP ***
1201 IF F=2 THEN PRINT"OK, I DRO
PPED IT.":CA=CA-1:OB(O)=YOU: ELS
E PRINT"I DON'T HAVE IT."
1210 REM If mirror is dropped, b
reak it, change object and delet
e it from object list
1220 IF O=7 THEN PRINT"THE MIRRO
R BROKE INTO A MILLION PIECES!":
OB$(7)="BROKEN MIRROR":GOSUB8000
:GOTO260
1299 GOTO 260
1300 '*** OPEN ***
1301 IF F=0 THEN PRINT"I DON'T S
EE IT HERE.":GOTO260
1310 REM If display case in the
room and key not in inventory, d
o not open
1320 IF OB(5)=YOU AND OB(4)<>-1
THEN PRINT"SORRY, IT'S LOCKED":G
OTO260
1330 REM if display case in the
room and key in inventory, then
open
1340 IF OB(5)=YOU AND OB(4)=-1 T
HEN PRINT"OK, IT'S OPEN":OB(6)=Y
OU:GOTO260
1345 REM If mail box in room the
n open it and bring Rainbow to t
he room
1350 IF OB(2)=YOU THEN PRINT"OK,
 IT'S OPEN.":OB(3)=YOU:GOTO260
1399 PRINT"SORRY, IT DOES NOT OP
EN.":GOTO260
1400 '*** CLOSE ***
1401 IF F=0 THEN PRINT"I CAN'T C
LOSE ANYTHING THAT I   CAN'T SEE
 OR DON'T HAVE.":GOTO260
1499 PRINT"I TRIED, BUT IT DOESN
'T CLOSE.":GOTO260
1500 '*** EXAMINE ***
1501 IF F=0 THEN PRINT"I DON'T S
EE ANYTHING LIKE THAT  AROUND HE
RE.":GOTO260
1509 REM If shinny object, then
describe
1510 IF O=4 THEN PRINT"IT'S A KE
Y!":GOTO260
1515 REM If Rainbow, then descri
be
1520 IF O=3 THEN PRINT"IT'S A CO
LOR COMPUTER MAGAZINE.":GOTO260
1525 REM If mirror, then describ
e and set flag F(1)
1530 IF O=7 THEN PRINT"I SEE MYS
ELF ON THE MIRROR.":PRINT"I AM W
EARING A WATCH.":F(1)=1:GOTO260
1599 PRINT"NOTHING SPECIAL ABOUT
 IT.":GOTO260
1600 '*** PUSH ***
1699 PRINT"NOTHING HAPPENED.":GO
TO260
1700 '*** BREAK ***
1701 IF F=0 THEN PRINT"NOTHING L
IKE THAT AROUND HERE   THAT I CA
N BREAK.":GOTO260
1705 REM If display case, then b
reak it and end game
1710 IF O=5 THEN PRINT"YOU BROKE
 THE CASE AND YOU WERE SENT TO J
AIL FOR YOUR ACTIONS.":PRINT"SOR
RY, BUT YOU HAVE TO START   THE
 GAME OVER.":END
1799 PRINT"I TRIED, BUT I COULDN
'T BREAK IT":GOTO260
1800 '*** ENTER ***
1801 IF F=0 THEN PRINT"I DON'T S
EE ANYTHING LIKE THAT  AROUND HE
RE.":GOTO260
1805 REM If bus but no money, th
en can't get in
1810 IF O=1 AND OB(9)<>-1 THEN P
RINT"THE BUS DRIVER WON'T LET ME
 IN.":GOTO260
1815 REM If bus and have money,
then enter, switch to room 3 and
 delete bus from room
1820 IF O=1 AND OB(9)=-1 THEN PR
INT"OK, THE BUS DRIVER LETS ME I
N,  I RIDE FOR A WHILE AND THEN
GET OFF THE BUS.":YOU=3:OB(9)=0:
GOTO260
1899 PRINT"I TRIED TO ENTER BUT
COULDN'T.":GOTO260
1900 '*** READ ***
1901 IF F=0 THEN PRINT"I DON'T S
EE IT HERE.":GOTO260
1905 REM If sign, then describe
1910 IF O=8 THEN PRINT"SIGN SAYS
:":PRINT"  WE BUY AND SELL JEWEL
RY":GOTO 260
1915 REM IF Rainbow, then descri
be and end game
1920 IF O=3 THEN CLS:PRINT"YOU H
AVE JUST READ THE MOST   VALUA
BLE PIECE OF LITERATURE   AVAIL
ABLE FOR THE COCO."
1930 IF O=3 THEN PRINT:PRINT"YOU
 HAVE ALSO REACHED THE END   OF
THIS ADVENTURE.":PRINT:PRINT"  C
ONGRATULATIONS!":END
1999 PRINT "NOTHING SPECIAL":GOT
O260
2000 '*** LOAD ***
```

See ADVENTURE—Page 16

ADVENTURE—From Page 15

```
2001 IF F<>2 THEN PRINT"I DON'T
HAVE IT.":GOTO260
2005 REM If computer tape and co
mputer not in room, then describ
e
2010 IF O=6 AND OB(10)<>YOU THEN
 PRINT"THERE IS NO COMPUTER HERE
.":GOTO260
2015 REM If computer tape and co
mputer in room, then load, drop
tape and set flag F(2)
2020 IF O=6 AND OB(10)=YOU THEN
PRINT"OK, THE TAPE IS NOW LOADED
":OB(6)=YOU:F(2)=1:GOTO260
2099 PRINT"I TRIED, BUT NOTHING
HAPPENED.":GOTO260
2100 '*** RUN ***
2105 REM If computer and it is i
n room and flag F(2) was set the
n describe, set flag F(3) and pl
ace bus in room 2
2110 IF O=10 AND OB(10)=YOU AND
F(2)=1 THEN CLS:PRINT"THE SCREEN
 SHOWS:":PRINT:PRINT"SPECIAL BUL
LETIN:":PRINT"THE BUS COMPANY HA
S REINSTATED  THEIR BUS SERVICE
TO THIS AREA.":F(3)=1:OB(1)=2:GO
TO260
2115 REM If computer and it is n
ot in room then describe
2120 IF O=10 AND OB(10)<>YOU THE
N PRINT"THERE IS NO COMPUTER HER
E.":GOTO260
2125 REM If computer and flag F(
2) was not set then describe
2130 IF O=10 AND F(2)<>1 THEN PR
INT"THE COMPUTER DOES NOT RUN WI
TH- OUT A PROGRAM.":GOTO260
2199 PRINT"DON'T BE RIDICULOUS!"
:GOTO260
2200 '*** SELL ***
2205 REM If not in room 8 then d
escribe
2210 IF YOU<>8 THEN PRINT"YOU AR
E NOT AT THE RIGHT PLACE  FOR SE
LLING ANYTHING.":GOTO260
2215 REM If in room 8 and sellin
g watch and flag F(1) was set th
en allow sale, place watch in ro
om and money in inventory
2220 IF YOU=8 AND  O=11 AND F(1)
=1 THEN PRINT"OK, I SOLD THE WAT
CH.":OB(11)=8:OB(9)=-1:GOTO260
2225 REM If flag F(1) not set th
en describe
2230 IF F(1)<>1 THEN PRINT"YOU N
EED TO FIND OUT WHAT KIND  OF JE
WELRY YOU HAVE BEFORE YOU  CAN S
ELL ANY OF IT.":GOTO260
2299 IF F<>2 THEN PRINT"I DON'T
HAVE IT TO SELL.":GOTO260
3000 '*******DIRECTIONS******
3010 DATA NORTH,SOUTH,EAST,WEST,
UP,DOWN
4000 '*******  ROOMS  *******
4010 DATA ON A KENTUCKY STREET,2
,4,7,6,0,0
4020 DATA AT A BUS STOP,0,1,0,0,
0,0
4030 DATA IN A POST OFFICE,0,0,0
,0,0,0
4040 DATA ON A WINDING ROAD,1,6,
4,5,0,0
4050 DATA AT A DEAD END STREET,6
,4,4,6,0,0
4060 DATA ON A WINDING ROAD,4,5,
I,4,0,0
4070 DATA IN A SHOPPING CENTER,8
,10,9,1,0,0
4080 DATA IN A PAWN SHOP,0,7,0,0
,0,0
4090 DATA IN A COMPUTER STORE,0,
0,0,7,0,0
4100 DATA IN A CLOTHING STORE,7,
0,0,0,0,0
4999 DATA END
5000 '****** OBJECTS *****
5010 DATA A CITY BUS,BUS,0
5020 DATA A MAIL BOX,BOX,3
5030 DATA LATEST RAINBOW ISSUE,R
AI,0
5040 DATA A SHINY OBJECT,OBJ,5
5050 DATA A DISPLAY CASE,CAS,9
5060 DATA A COMPUTER TAPE,TAP,0
5070 DATA A MIRROR,MIR,10
5080 DATA A SIGN,SIG,8
5090 DATA MONEY,MON,0
5100 DATA A COLOR COMPUTER,COM,9
5110 DATA WATCH,WAT,0
5999 DATA END
6000 '****** VERBS ******
6010 DATA GET,DROP,OPEN,CLOSE,EX
AMINE,PUSH,BREAK,ENTER,READ,LOAD
,RUN,SELL
6999 DATA END
7000 '***** SAVE/LOAD ********
7010 GOSUB7130:OPEN"O",DV,"DATA"
7020 PRINT#DV,YOU
7030 FOR X=1 TO NO
7040 PRINT#DV,OB(X)
7050 NEXT X
7060 CLOSE:CLS:GOTO140
7070 GOSUB7130:OPEN"I",DV,"DATA"
7080 INPUT#DV,YOU
7090 FOR X=I TO NO
7100 INPUT#DV,OB(X):NEXT X
7110 IF EOF(DV) THEN CLOSE
7120 CLS:GOTO140
```

```
7130 CLS:PRINT"INDICATE DEVICE T
O BE USED:"
7140 PRINT:PRINT"  C - CASSETTE
    D - DISK"
7150 PRINT:INPUT"YOUR CHOICE";DV
$
7160 IF DV$="D" THEN DV=1 ELSE I
F DV$="C" THEN DV=-1 ELSE 7150
7170 PRINT:PRINT"PRESS ANY KEY W
HEN THE DEVICE   IS READY."
7180 IF INKEY$=""THEN7180 ELSE R
ETURN
8000 '***ELIMINATE OBJECT FROM
8010 '   OBJECT LIST
8020 MID$(OB$,O*3-2,3)="   "
8030 RETURN
```


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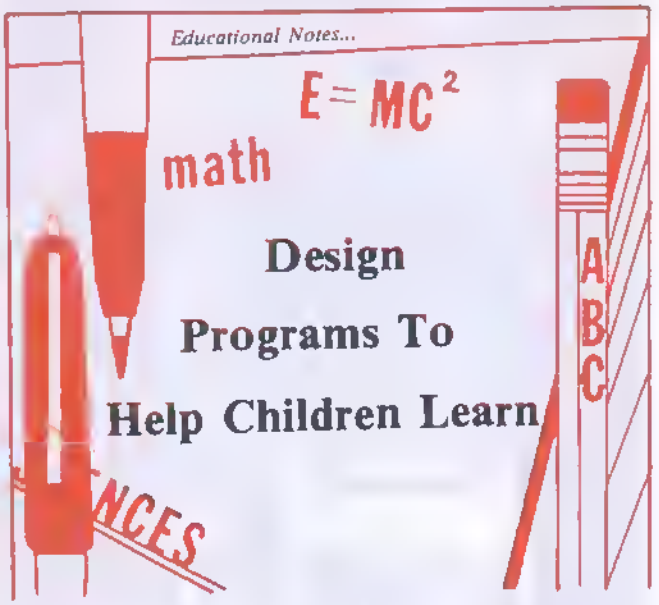

By Steve Blyn
***Rainbow* Columnist**

(Mr. Blyn, who teaches both exceptional and gifted children, holds two Master's degrees in the field of education and has won an award for the design of a computer program to aid handicapped children. He and his wife, Cheryl, own Computer Island.)

There is much discussion and confusion on exactly how children learn. Learning theory is not nearly so exact as is computer theory. It is generally agreed, however, that different individuals have different styles and modes of learning.

Some children learn best by viewing the material, others by hearing it, and still others by physically manipulating it. This is akin to the senses of sight, hearing and touch.

The procedure holds true into adulthood. Many of us feel most comfortable when we see a computer printout of a certain program. Others cringe at this and are best off when they hear someone talking about the program. And yet others are most at ease when they are left alone to manipulate and decipher the program by themselves at the keyboard.

Research has shown that all children have a preferred mode of learning. Teaching should be geared to the strongest mode that the child uses. He will then be geared to reap the greatest amount of learning.

There are children, without physical impairments, who will learn almost nothing if their particular mode of learning is not used. This is the reason that some beautifully executed programs are unable to teach many children: The particular gimmick the programmer used may be performing well, but it may not be tuned to the way some children must approach learning. A variety of teaching modes is the strongest approach one can use without knowing each individuals' strengths and weaknesses.

When we design educational programs for children, we should keep in mind the diversity of learning styles of the ultimate users of our programs.

Fortunately, the Color Computer permits us to reach children through several modes. The wonderful high and low resolution graphics, the powerful sound and play commands, the keyboard and, of course, the colors, offer programmers many avenues. It would be best if each program incorporated as many of these features as possible.

The following program, *BEEPEROO,* is a simple one which can be used to reinforce the concept of simple addition of three digit numbers. In keeping with the general concepts outlined above, this skill is approached from several directions to reach the largest number of users of the program.

Children are able to view the example in both vertical and horizonal format. The user inputs the answer and it appears in both formats. INPUT, rather than INKEY, is used to give the child a chance to change his answer before pressing ENTER. If an incorrect answer is given, it is changed to the correct answer in the vertical format only. This gives the user the opportunity to compare the answers and see his mistake.

To assure proper alignment of the answers in the vertical format, the answers are checked to see whether they are a single or a two-digit number and the cursor is adjusted accordingly. Accidental answers of more than two digits are prevented in this program.

The user may either do the example mentally, or listen and count the sounds, look at and count the pictures, or do the example on a separate sheet of paper and then put in the answer. The child may, thus, use any mode with which he is most comfortable to do this type of example. He may also experiment with the other modes to see which type is most effective for him.

The program is purposely written to fit the 4K standard BASIC computer so that all readers may use it. Feel free to use and modify this program to suit your needs and computer size. Some suggestions might be to try substituting PLAY commands for SOUND, using POKE commands rather than SET and creation of high resolution graphics as a reward for correct answers.

The Listing:

```
10 ' BEEPEROO
20 ' S.BLYN  1981
30 ' COMPUTER ISLAND
40 CLS8
50 PRINT@12,"beeperoo";
```

FLASH . . . FLASH . . .

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```
60 FORX=0TO63STEP4:SET(X,4,7):SE
T(X,5,7):SOUNDRND(150),1:NEXTX
70 FORX=0TO63STEP4:SET(X,26,7):S
ET(X,27,7):SOUNDRND(150),1:NEXTX
80 PRINT@130,"A PROGRAM FOR ADDI
NG NUMBERS";
90 PRINT@224,"WHAT IS YOUR NAME"
;:INPUT N$
100 PRINT@320,"  COUNT THE BEEPS
 OR PICTURES   TO HELP GET THE C
ORRECT ANSWER."
110 FORT=1TO500:NEXTT
120 PRINT@485,"PRESS ANY KEY TO
BEGIN";
130 Q$=INKEY$
140 FOR T=1 TO 50:NEXT T
150 IFINKEY$=""THEN120
160 'U=CORRECT D=WRONG AND P=COU
NTER
170 D=0:U=0:P=1
180 IFP>10THENGOTO440
190 CLS:X=RND(9):Z=RND(9):R=RND(
9)
200 PRINT"     ";N$"'S  EXAMPLE #
";P:PRINT
210 P=P+1
220 PRINTSTRING$(32,191);
230 PRINT"      ";X;" + ";Z;" + "
;R;" ="
240 PRINTSTRING$(32,191);
250 PRINT
260 FORT=1TO500:NEXTT
270 FORQ=1TOX:PRINTCHR$(166)+CHR
$(169);" ";:SOUND175,4:NEXTQ:PRI
NTTAB(28)X
280 FORT=1TO100:NEXTT
290 PRINT:FORQ=1TOZ:PRINTCHR$(24
6)+CHR$(249);" ";:SOUND50,4:NEXT
Q:PRINTTAB(28)Z
300 FOR T=1TO100:NEXTT
310 PRINT:FOR Q=1TOR:PRINTCHR$(1
98)+CHR$(201);" ";:SOUND125,4:NE
XTQ:PRINTTAB(28)R
320 PRINT"
     ----"
330 '***CHECK FOR SINGLE OR DOUB
LE DIGIT ANSWER
340 IF X+Z+R>9 THEN FF=384
350 IF X+Z+R<10 THEN FF=385
360 PRINT@FF,"  PUT YOUR ANSWER
HERE    ";:INPUT W
370 '*** CHECK FOR TOO LARGE AN
ANSWER
380 IF W>99 THEN PRINT@410,"
  ";:SOUND20,1:GOTO 360
390 PRINT@118,W
400 IFW=X+Z+R THEN PRINT@384," Y
AY!!! CORRECT ANSWER";:U=U+1:FOR
T=1TO250STEP20:SOUNDT,1:NEXT
410 IFW<>X+Z+R THEN PRINT@384,"S
ORRY,THE CORRECT ANSWER IS";X+Z+
R:D=D+1:FORT=1TO3:SOUND50,3:NEXT
420 PRINT@484,"PRESS ENTER TO GO
 ON";:INPUTPR$
430 GOTO180
440 FORT=1TO300:NEXT
450 CLS4
460 FORX=100TO250STEP5:SOUNDX,1:
NEXTX
470 PRINT@34,"REPORT CARD FOR ";
N$;
480 FORX=250TO100STEP-5:SOUNDX,1
:NEXTX
490 FORX=0TO63:SET(X,7,6):SET(X,
9,6):NEXTX
500 FORX=0TO63:SET(X,25,6):SET(X
,27,6):NEXTX
510 PRINT@198,"NUMBER CORRECT ";
U;
520 PRINT@262,"NUMBER WRONG   ";
D;
530 PRINT@324,"  YOUR SCORE WAS
";U*10;"%";
540 FORT=1TO1000:NEXTT
550 PRINT@480,"WANT TO PLAY AGAI
N (Y OR N)";:INPUTV$
560 IFV$="Y"ORV$="YES"THENGOTO17
0
570 CLS:PRINT"BYE FOR NOW ";N$:E
ND
```


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Software Review...

Cer-Comp Adds Fine R. S. Disk System

Cer-Comp, which has been offering a disk system for the Tallgrass Technologies disk, now has added a series of products for the Radio Shack disk controller. This offers users an option of another operating system and several utilities not available through Radio Shack at this time.

The package includes an editor/assembler, a text editor/word processor and a terminal package. Actually, there are two word processors—*Textpro I* and *Textpro II*. The *Textpro II* has a number of additional features and sells for $30 more.

There is also a disk terminal package which has a full set of features and can be used with the word processor package.

Readers will recall we were impressed with Cer-Comp's operating system and utilities for the Tallgrass disk controller. We must say that we have the same good feelings about this system—with the added convenience of usage with the Radio Shack system.

One of the primary reasons we asked Dennis Lewandowski to begin writing his *Assembly Corner* was because of the growing interest in machine language programming by 80C users. The editor/assembler in the Cer-Comp package is a full-blown system which is, on the one hand, easy to use while, on the other, comprehensive enough to do anything the assembly language programmer wishes.

An assembler will allow you to use something called "op code" to construct machine language programs. Most of the ML programs you have seen, most likely, have been those with these op codes, such as STA, LDX, BRA and so forth. Using the op codes is much more simple than using the hexidecimal numbers of the instructions in a hand assembly.

By using the op codes, the Cer-Comp system will generate binary code (the step beyond hand assembly of hexidecimal numbers) to memory, to tape or to disk. The code is constructed by the editor and then assembled into binary code by the assembler. Since it is a two-pass assembler, there are a number of options available. In pass one, the assembler either builds a new symbol table or adds to the table it already has. Passes two and three allow the code to be generated to either a disk, tape or memory. Listings, and error messages, can also be routed to the printer. While it may seem strange to say that a program uses two passes and then refer to passes two and three, that is because this system allows use of these two "final" passes so that you can run pass three for a program which is debugged. When pass three is run, it first runs pass one (which builds the symbol table) and then runs pass three with whichever options you select.

The full range of 6809 instructions is allowed and, in addition, the program will translate 6800 instructions into 6809. However, there are some options in expressing code which are not available in all assemblers. In the auto decrement specification, the Cer-Comp program allows use of -R, as well as ,-R. Since this is the same format as auto increment, it can make things easier.

We believe this is a good addition to any serious assembly language programmer's arsenal. It carries a full range of features and functions and has the added advantage of allowing assembly to disk.

We do wish there were a little more to the documentation,

but, at the same time, you cannot expect a course in assembly language just by purchase of the software to do assembly. We do commend Cer-Comp for its explaination of the directives, a sometimes mystifying subject which is well and throughly handled in the documentation.

This program is an implementation of the text editor Cer-Comp has available for the Tallgrass system. We commented on it earlier (in May) and this version is essentially the same.

The disk editor can be used to write programs, whether they be in BASIC or assembly language. It has a number of features which make it easier to write programs either way, but where it really shines is in some of the features it employs to enhance writing in BASIC.

To our mind, first and foremost of these is the AUTO command. Much like the same command on other TRS-80® systems, this allows the computer to enter the line numbers for you, in any increment you desire. Honestly, this isn't really a case of "bells and whistles"—it is super handy, especially when writing data statements. There is also a tape append function, which allows one tape file to be added to the end of another file already in memory. This can, of course, be done with disk files, hut not with tape files without some jiggering around with PEEKs and POKEs.

You also have the ability to set line length, something that can be handy if you are using the program as a text processor—or if you just want program lines the same width as your printer. You can also remove (or add) line numbers. A handy feature that can save memory space.

And speaking of memory space, the ROLL command allows only a portion of a file in memory to be written out to the text buffer. The user then has the option of writing or loading more information without regard to the memory size of his 80C.

As we reported previously, this program is a good one and can serve many purposes. It works hand-in-glove with the editor-assembler, but has many other uses as well.

The *Textpro* word processors work well, and do most of the things one would expect in a word processing program.

Both have a variety of features such as word search, justification, word fill and the like. This program was reviewed extensively in *the RAINBOW* before and we continue to be impressed with it. Its availability for the Radio Shack disc system can only increase its usefulness.

The advanced version features a number of important additional options, primarily affecting use with tabs and columns. Another significant option is a programmable stop, which will allow keyboard input of "personal" information during word processing.

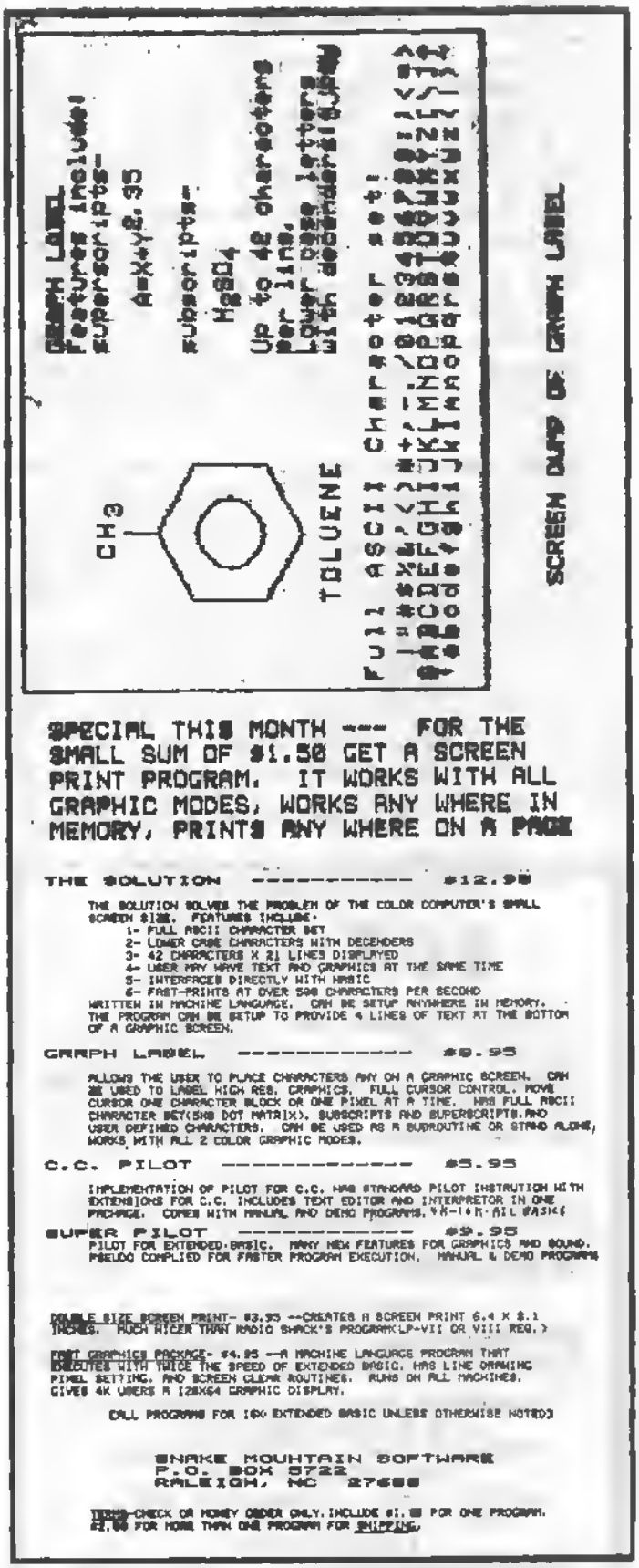
Terminal Package

This program is called *Datapack* and has a full range of features, including wordwrap, that make it easy to operate a modem and a disk system at the same time. Because it is not tied to tape I/O, reading and writing the contents of your file buffer (usually filled from a distant computer via modem) is fast. You do, however, have a tape option.

In addition, *Datapack* has all the technical goodies you need in order to communicate with other computers and bulletin boards. You can set such things as baud rate, stop bits and the like. You even have the ability to enter BASIC if you so desire.

As with the other programs in this impressive package, the addition of disk capabilities is a major bonus. We believe they deserve a close look from anyone interested in utilities of this kind. The fact that all now are available with the Radio Shack system is of major significance to those who want to stay with the Tandy hardware offerings.

(Cer-Comp, 5566 Ricochet Avenue, Las Vegas, NV 89110. Editor/Assembler, $79.95; Textpro I, $49.95; Textpro II, $79.95; Datapack, $49.95)



Tutorial...

Playing Around With Your 80C

16K ECB

By Paul Penrose

The PLAY command is really a very versatile and powerful addition to BASIC. It allows the programmer to read a series of notes from a piece of sheet music (assuming you can read or figure out music) and type it, almost verbatim, into the program. Then, the computer will play it back at any time you ask it to do so.

However, many people do not realize that the PLAY command can do a great deal more. A creative person can use PLAY to create many "arcade-like" sounds and the key to this is the understanding that the major controlling parameters for PLAY all have a wide range of settings.

By controlling parameters, I am referring to the play subcommands of O, V, T, L and N. First, I want to talk a little bit about each one and then show how they can be used to produce sound, much like we do at Rainbow Connection Software.

The "O" subcommand is used to set the Octave and has five settings in the range 1-5. "O2" corresponds to the octave which contains "middle C," so you can infer that PLAY is better suited to playing higher notes than it is to producing lower ones. The thing to realize here is that you have a wide range of pitch values that you can use and that utilizing them all will enhance sound effects for your programs.

The "V" subcommand controls the volume at which the sound is to be PLAYed and has a range of 1-32. This subcommand seems to be one of the most overlooked when people create sound effects and music with PLAY. You can create cresendos by adding "V+" between every note or so in the area of the music that is supposed to get louder. This can also be used to add emphasis to certain notes. For example, you could do a "V15...V20;C;V15..."and this would add emphasis to the note "C". It can also be used in conjunction with some other techniques to create some really great sound effects—which I'll get into later.

PLAYing a piece of music at a faster of slower tempo than it was originally written can produce some interesting results. This is accomplished by the "T" subcommand, which can be set anywhere between 1 and 255. Most music would be played at tempo 3 or 4 if you want it to sound "normal."

If you do not want to refer to musical notes in the usual fashion (A, B, C and so on), you can use the numerals 1-12 instead. Just precede the numeral with the letter "N." This notation (no pun intended) is sometimes easier to use when you are concentrating on making a sound effect as opposed to a musical piece.

The last subcommand I will discuss is "L", which varies the length of time the note will be played. The range for "L" is 1-255, where 1 is a whole note, 2 a half note, 3 a third note and so on.

Type in the following program and RUN it:

```
10 PLAY "V15;O4;T255;L255"
20 FOR X=1 TO 100
30 PLAY "C"
40 NEXT X
```

What you just heard was 100 1/255th "C" notes, one played right after the other. Type PLAY "C" on your 80C and ENTER it. What did you hear? A little click? Well, that's what you should have heard because a 1/255th note is so short that a little click is about all that will be produced (almost). And, as you heard earlier, playing a bunch of them in a row makes a strange sound. Try changing some of the settings in the program, above and see what happens.

Now try this program:

```
10 PLAY "V15;O1;T255;L255"
20 FOR X=12 TO 1 STEP-1
30 A$="N"+STR$(X)
40 PLAY A$
50 NEXT X
```

This illustrates how the "N" subcommand can be used very nicely to simplify the program a bit. Experiment with this program, too, and find out what other kinds of sounds it can produce.

One of the best sound effects I have found uses some of the above techniques while changing the volume. To see what I mean, type this in and RUN it:

```
10 PLAY "V15;O3;T255;L255"
20 FOR X=1 TO 15
30 PLAY "C;V-"
40 NEXT X
```

RUN it a few times. Try changing the note "C" to something else. Or, maybe, change the octave. After you have played with that a while, change Line 30 to read:

```
30 PLAY "CDEACB;V-"
```

We have only covered the tip of the iceberg in discovering the wide variety of sound effects possible using the PLAY command. However, I hope you will become interested enough that you will move on and create even better sound effects for your own programs.

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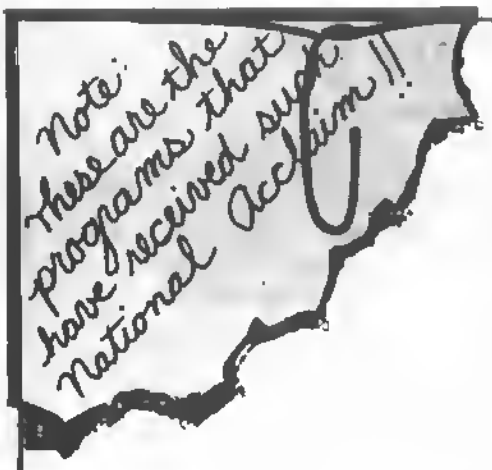

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Hardware...

Synchronizing With Your SAM Chip

By Alan J. Morgan

After writing my last article on the 6883 SAM chip ***(the RAINBOW, May)***, I realized I may have unintentionally confused more people than I had helped. Therefore, with the able assistance of th Motorola Data Book, I attempt here to bring you the truth about the 6883 SAM.

To make this subject more meaningful, I will use several diagrams. In this way, I hope to help those of you who are interested in becoming experts on the chip to do so. If you will follow the diagrams (two are shown—one for the Type 0 and one of the Type 1 version of the SAM).

MPU Addresses (A0 — A15): These signals are generated by the MPU and are used to directly address up to 64K of memory locations. They can also address up to 96K memory locations by using a paging bit.

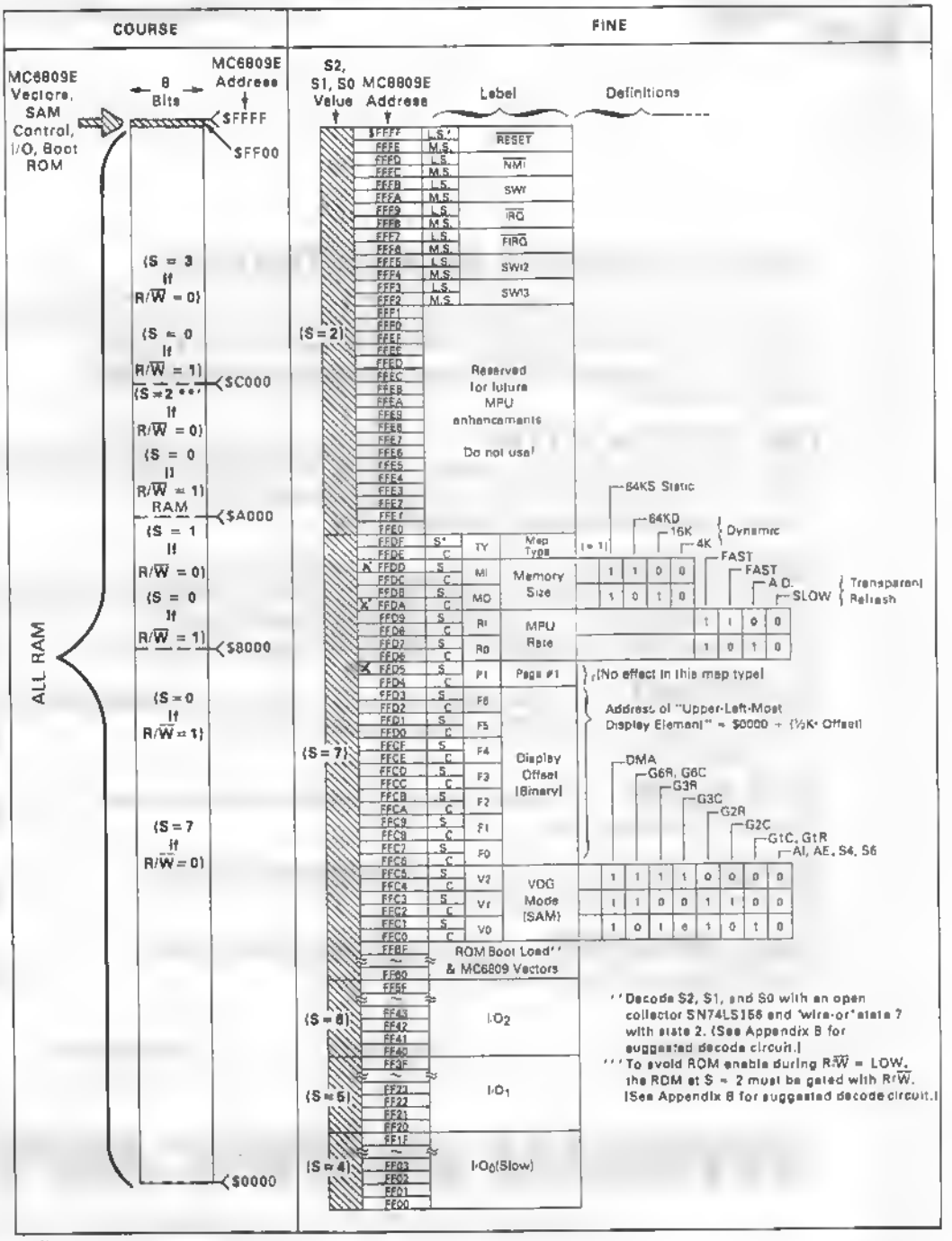
Changing the MPU Rate: Two bits in the SAM control register determine the period of both the "E" and "Q" clocks. Three rates modes are implemented as follows (refer to the map): The SLOW mode, R1=0, R0=0; this rate is automatically selected when the SAM is reset. The second rate is called Address Dependent, R1=0, R0=1; this is the mode most used by some of us to increase speed. The third mode is the FAST mode, R1=1, R0=1/0; in which neither the Video Display Generator (VDG) or the SAM refresh are available. If the address dependent mode is selected, addresses (hex) 0000 to 7FFF and FF00 to FF1F use the SLOW speed of .9 MHz while all others use the faster speed of 1.8 MHz.

VDG Addressing Mode: Three bits (V2, V1 and V0) control the sequence of DISPLAY ADDRESSES generated by the SAM (which are used to scan dynamic RAM for video information).

VDG Address Offset: Seven bits, (F6-F0) determine the starting address for the video display. The starting address is the address corresponding to data displayed in the upper left corner of the television monitor screen.

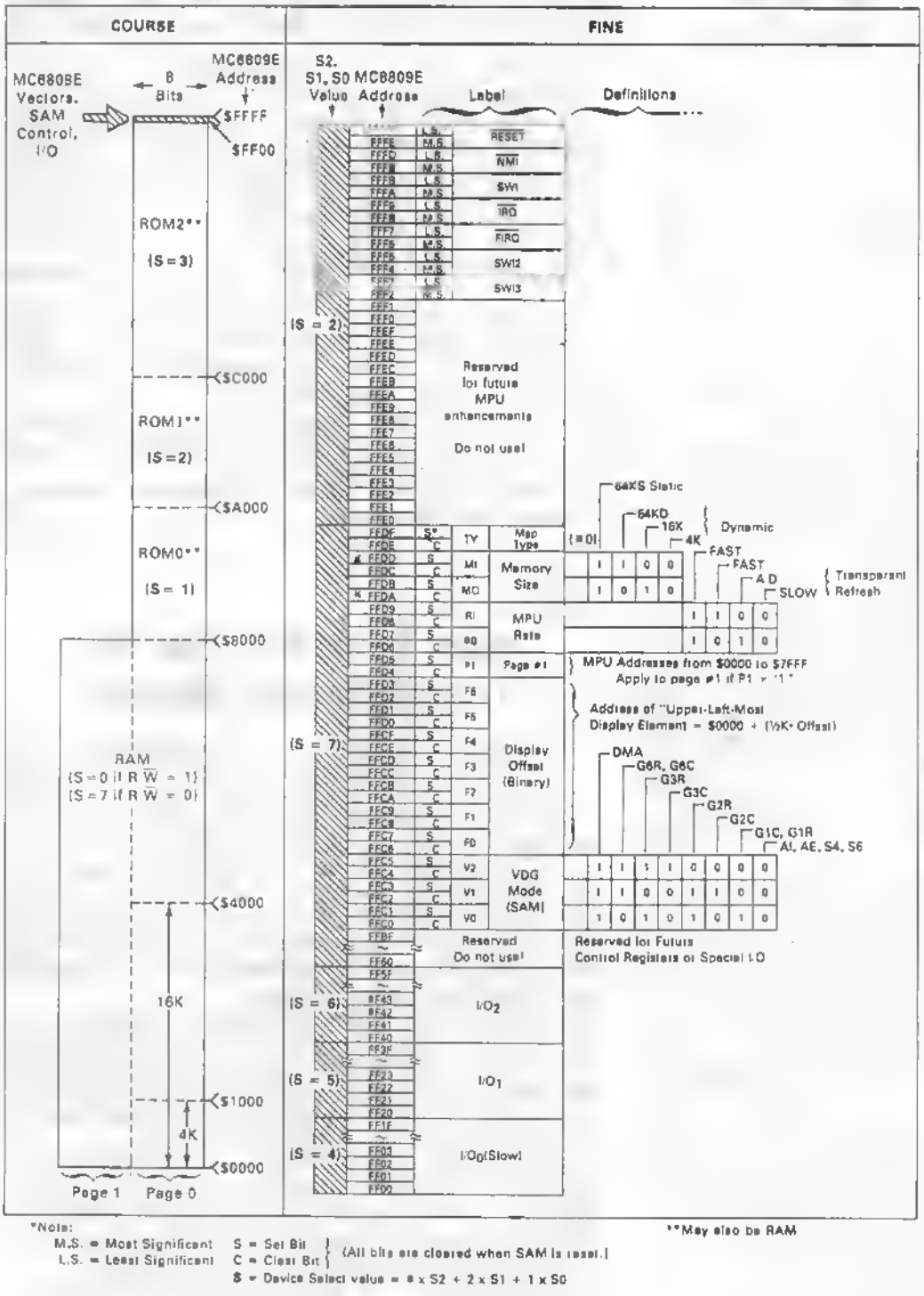
Page Switch: One bit (P1) is used 'in place of ' A15

FIGURE 15 — MEMORY MAP (TYPE #1)



' Note:
M.S. = Most Significant
L.S. = Least Significant
S = Set Bit
C = Clear Bit
(All bits are cleared when SAM is reset.)
B = Device Select value = 4 x S2 + 2 x S1 + 1 x S0

FIGURE 14 — MEMORY MAP (TYPE #0)



*Note:
M.S. = Most Significant
L.S. = Least Significant
S = Set Bit
C = Clear Bit
(All bits are cleared when SAM is reset.)
S = Device Select value = 4 x S2 + 2 x S1 + 1 x S0

**May also be RAM

CORRECTIONS

In the eight-bit driver program in the April issue, two of the hexidecimal numbers are incorrect. Line 280 should read DATA 8E and Line 290 should be DATA BF.

In the Assembly Corner listing in June, the proper address is $0400, not $4000 as printed.

from the MPU in order to refer access within $0000 to $7FFF to within one of two 32K byte pages of RAM. If the system does not use more than 32K bytes of RAM, the P1 is ignored.

Memory Size: Two bits (M1 and M0) determine RAM memory allocation. The options are: One or two banks of 4K x 1 dRAMs, M1=1, M0=0. One or two banks of 16K x 1 dRAMs M1=0, M0=1. One bank of 64K x 1 dRAMs M1=1, M0=1. The SAM must be programmed to the correct memory size before using RAM for subroutine stack.

Map Type: One bit (TY) is used to select between two memory map configurations. When 'TY' is 0 the ROM-based config-uration is used (as for the 4K-32K Color Computer). When 'TY' is 1, the RAM based configuration is used (64K Color Computer).

It is worth noting that only the SLOW speed can be used with the RAM configured for the Color Computer (TY=1).

As you can see, the SAM is a multipurpose chip which is complicated, to say the least. Many of the operations have been left out of this article, as to place all of them here would require the entire issue of ***the RAINBOW***.

For those of you who would like more information on the 6883 and its operation (as well as all the chips in the Color Computer), I strongly suggest writing to Motorola Semiconductor Products Inc., P. O. Box 20924, Pheonix, AZ, 85036. Or, call your local Motorola representative.

The book to ask for is the *Motorola Microprocessor Data Manual* for the 6800 family. Price is unknown, but in the majority of cases, they will send it free of charge. It contains a great deal of data than is not available in the Radio Shack *Technical Manual*.

I hope this has cleared up some of the mystery behind the SAM chip.

Software Review...

SPELL 'N FIX A Great Utility For Those Who Can't

Peter Stark must have been looking over our shoulder, and a lot of others too, all through school when we were handed back papers that counted off numerous points for spelling errors.

What we would consider the "most desired" utility to go with all the word processing programs is now available, a program called *SPELL 'N FIX* that will check every word you type into a letter, report or the like and tell you whether it is spelled wrong. If it is, the program allows you to correct it right then and there.

SPELL 'N FIX in some ways is not a new program. It has been run and tested for quite some time for the 6800 system but is available now for the Radio Shack disk system as well. In addition, a cassette version is also available.

In order to use this program, you simply type in your text as you would normally, then save the text file to disk or cassette. You then load the *SPELL 'N FIX* program, run through a list of options and end up with a corrected version of what you typed in in the first place.

Just how this program does all this is by use of a large (20,000 word) dictionary which is part of *SPELL 'N FIX*. It compares every word you typed into your word processing program with its dictionary and, when it locates a word which is not in the dictionary, it prints it out. When it does, it gives you an option of ignoring that word, marking it as incorrect, marking all words which are found to be wrong as incorrect (a sort of auto-pilot) and quitting and going home. Then, it allows you to write a new text file with the incorrect words either changed into correct ones or simply marked in the copy for your perusal later. Once that is done, you can re-run the word processor you are using and get selling error-free copy.

But, there is another option, too (available within the program itself only with the disk system) that allows you to add new words to the dictionary. This can be very helpful. Let's suppose you write a lot of letters to other Color Computer users and you use the term 80C a lot. The "word" 80C is not in the dictionary, so every time you run *SPELL 'N FIX* you will get that word marked as an error. You can simply tell the program to add 80C to its dictionary and, from that point on, it will be a word that is "acceptable" to *SPELL 'N FIX*.

This program works fast and with no trouble whatsoever with two disk drives. With a single disk, you have to either change the disks or put it, your word processor and text files on the same disk (there is room). With a cassette-based system, the process of reading and examining the dictionary is, of necessity, slow but it does work.

We think it important to point out that, as with any spelling correction program, *SPELL 'N FIX* will not make distinctions between such constructions as to, too and two. But, if you make "misteaks" in your typing, it will handle things like a charm. And, since you don't have to worry about such things as spelling, you can probably type faster, too. It will find those errors and let you fix them quickly.

One thing that will sometimes be marked as an error is a word with an embedded function code (as used by some word processors). However, you can instruct the system to simply ignore these when they show up and it is no hassle.

The program uses normal ASCII files (which is the form used by most text processors) and our tests with several word processing programs, *TEXT EDITOR*, *WORDCC7*, *CCWRITER* and *COLOR SCRIPSIT* showed no problems. There is a special utility for interfacing it with the *TELEWRITER* program, which saves text files in a different way.

The program also has an interesting utility for disk users, an automatic reset function, which brings the 80C back into its startup status. Since it might sometimes be necessary to power down the 80C to switch from *SPELL 'N FIX* to a word processor, this saves you the trouble of removing the disk(s) from your drives, turning the power off, turning it back on again and replacing the disk(s). You can also create text files with the program.

We are very impressed with *SPELL 'N FIX*. It handles the correcting function quickly and efficiently, the documentation is excellent and the dictionary is large enough to address most word processing needs. With the added expandability factor, any needs can be addressed—depending on what yours might be.

This is an excellent program and an outstanding buy which is easy and comfortable to use. It will make any word processing you do go faster and easier.

(Star-Kits, P. O. Box 209, Mt. Kisco, NY 10549, $69.95 disk or cassette, $89.29 FLEX disk)

Software Review...

Now Your 80C Can Be Your Excercise Mentor

One of the things for which the 80C is really handy to have is to plan and program things for you. This is amply illustrated with programs like *DATE-O-BASE CALENDAR*, which we reviewed last month, and is no less true with this program, *EXERCISE PLANNER*.

This is a well-thought out program which allows you a number of various options in setting up an excercise schedule. The only thing we can see that it doesn't do is give you the raspberry if you don't keep it up to date. But then, if you are serious about excercise planning, then you probably wouldn't get the raspberry anyway.

The program can handle a maximum of 40 excercises on each schedule, and has the ability to let you do such things as alternate days, build up from, say, five pushups to a dozen a day, and set the schedule for the times when you plan to increase them. We can see how this might be useful, too, for those setting an excercise schedule for others.

The documentation is very complete, and it needs to be because—with so many options—this is a complicated program. We had no trouble running through it, however, and think you will find it easy to use once you get used to it.

The program is available on both tape and disk.

(Land Systems, P. O. Box 232, Bellbrook, OH 45305, $15 tape, $20 disk)

Look For The. . . . .

RAINBOW CERTIFICATION SEAL

FRP Column

Make Magic Rings On Magic 80C

16K ECB

By Bill Nolan
Rainbow Columnist

(Mr. Nolan, an experienced Dungeonmaster in a popular fantasy-role playing game on a weekly basis, is the President of Prickly-Pear Software.)

Happy July to all you fantasy gamers, and Happy Birthday to *the RAINBOW*. I'd hum a few bars of "Happy Birthday," but the copyright is still valid and I'd have to pay someone a royalty.

The program this month rolls up magic rings for you. That may not seem like much, but it takes 3K of memory to do the job. Instructions on operating the program aren't really needed, since the program is self-explanatory when you run it. You may want to look closely at some of the IF/THEN statements, however. I have found that these give people as much trouble as anything except, maybe, arrays (subscripted variables).

Let's consider a sample line. IF X=1 THEN 500:IF Y=2 THEN Z=3. That line has correct syntax, but it won't work, because if X does equal 1, the program will branch to Line 500 and if X does not equal 1, the program will go to the next line number.

This will be true of any "IF" statement. IF the condition is met, the program will continue on to the end of the current line unless you tell it to do otherwise (as we did above, sending the program to Line 500). But, if the condition is not met, the program will go to the next line and ignore everything else on the current line—even if you have 10 more statements back there just itching to have their turn.

To prevent this, you use an ELSE statement. For example, IF X=1 THEN 500 ELSE IF Y=2 THEN Z=3. This would work fine, and you can continue to run things together like this until you run out of space on the line. The main thing to remember is that you can only have one result from each IF statement.

In other words, the line IF X=1 THEN Y=3 ELSE IF X=2 THEN Y=4 ELSE GOTO 100 will work fine, but IF X=2:Z=3:ELSE IF. . . won't work at all.

The *RINGS* program is quite simple to operate once you type it in. When you hit a key, the program will roll percentage dice and deliver a ring based on the result. If the type of ring chosen requires additional rolls to fill out its characteristics, these will be made automatically and the results will be displayed. For instance, there are several types of protection rings, and the program will decide which type you have.

By the way, I hope to be hearing from many of you with suggestions for the title of this column. The rules (very few) were in last month's *RAINBOW*. The winner will be announced right here next month.

The program for next month will create dragons for you. They will come into being in some detail, including species, size, age, speaking ability, spell use, spells known and, of course, treasure. It will even calculate experience value.

Any suggestions can be addressed to me at Prickly-Pear Software, 3518 S. Randi Place, Tucson, AZ 85730.

The Listing:

```
1 '*********RINGS*********
2 '*******(C)  1982*******
3 '*PRICKLY-PEAR SOFTWARE*
10 CLS:PRINT@97,"HIT ANY KEY TO
ROLL UP A RING.":K$=INKEY$
15 K$=INKEY$:IF K$="" THEN 15 EL
SE SOUND 150,1:CLS
20 X=RND(TIMER):X=RND(100):IF X=
100 THEN 100 ELSE IF X=99 THEN 1
10 ELSE IF X>90 THEN 120 ELSE IF
 X>85 THEN 130 ELSE IF X>79 THEN
 140 ELSE IF X> 77 THEN 150 ELSE
 IF X>75 THEN 160 ELSE IF X>69 T
HEN 170
30 IF X>65 THEN 180 ELSE IF X>63
 THEN 190 ELSE IF X>61 THEN 200
ELSE IF X=61 THEN 210 ELSE IF X>
44 THEN 220 ELSE IF X=44 THEN 23
0 ELSE IF X>40 THEN 240 ELSE IF
X>33 THEN 250 ELSE IF X>30 THEN
260
40 IF X>27 THEN 270 ELSE IF X>21
 THEN 280 ELSE IF X>15 THEN 290
ELSE IF X=15 THEN 300 ELSE IF X>
12 THEN 310 ELSE IF X>6 THEN 320
 ELSE 330
100 PRINT@98,"RING OF X-RAY VISI
ON.":GOTO 400
```

See FRP—Page 28

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FRP—From Page 27

```
110 GOSUB 500:PRINT@98,"RING OF
WIZARDRY.":PRINT@130,X$:GOTO 400
120 PRINT@98,"RING OF WEAKNESS."
:GOTO 400
130 PRINT@98,"RING OF WATER WALK
ING.":GOTO 400
140 PRINT@98,"RING OF WARMTH.":G
OTO 400
150 Y=RND(4):PRINT@98,"RING OF 3
 ";:IF Y=4 THEN PRINT"LIMITED WI
SHES." ELSE PRINT"WISHES."
155 GOTO 400
160 GOSUB 550:PRINT@98,"RING OF
TELEKINESIS.":PRINT@130,X$:GOTO
400
170 PRINT@98,"RING OF SWIMMING."
:GOTO 400
180 PRINT@98,"PING OF SPELL TURN
ING.":GOTO 400
190 YY=RND(4)+1:PRINT@98,"RING O
F SPELL STORING.":Y=RND(10):IF Y
>3 THEN 195 ELSE Z=RND(4):IF Z=4
 THEN PRINT@130,"DRUIDIC RING OF
";YY;"SPELLS":GOTO 193
191 PRINT@130,"CLERICAL RING OF"
;YY;"SPELLS"
193 FOR C=1 TO YY:L=RND(6):IF L=
6 THEN L=RND(4)
194 PRINT@(C*32+130),"LEVEL";L:N
EXT:GOTO 400
195 Z=RND(10):IF Z=10 THEN PRINT
@130,"ILLUSIONIST RING OF";YY;"S
PELLS":GOTO 193
196 PRINT@130,"MAGICIAN'S RING O
F";YY;"SPELLS":FOR C=1 TO YY:L=R
ND(8):IF L=8 THEN L=RND(6)
197 PRINT@(C*32+130),"LEVEL";L:N
EXT:GOTO 400
200 PRINT@98,"RING OF SHOOTING S
TARS.":GOTO 400
210 Y=RND(10):IF Y=10 THEN PRINT
@98,"VAMPIRIC REGENERATION RING.
" ELSE PRINT@98,"RING OF REGENER
ATION."
211 GOTO 400
220 GOSUB 600:PRINT@98,"RING OF
PROTECTION.":PRINT@130,X$:GOTO 4
00
230 PRINT@98,"RING OF MULTIBLE W
ISHES.":Y=RND(4)+RND(4):PRINT@13
0,Y;"WISHES":GOTO 400
240 PRINT@98,"RING OF MAMMAL CON
TROL.":GOTO 400
250 PRINT@98,"RING OF INVISIBILI
TY.":Y=RND(10):IF Y=10 THEN PRIN
T@130,"CONFERS INAUDIBILITY"
255 GOTO 400
260 PRINT@98,"RING OF HUMAN INFL
UENCE.":GOTO 400
270 PRINT@98,"RING OF FREE ACTIO
N.":GOTO 400
```

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```
280 PRINT@98,"RING OF FIRE RESIS
TANCE.":GOTO 400
290 PRINT@98,"RING OF FEATHER-FA
LL.":GOTO 400
300 Y=RND(4):PRINT@98,"ELEMENTAL
 CONTROL RING.":IF Y=1 THEN X$="
AIR" ELSE IF Y=2 THEN X$="EARTH"
 ELSE IF Y=3 THEN X$="FIRE" ELSE
 X$="WATER"
305 PRINT@130,X$:GOTO 400
310 PRINT@98,"RING OF DJINNI SUM
MONING.":GOTO 400
320 PRINT@98,"RING OF DELUSION."
:GOTO 400
330 PRINT@98,"RING OF CONTRARINE
SS.":Y=RND(100):IF Y>80 THEN X$=
"STRENGTH" ELSE IF Y>70 THEN X$=
"SPELL TURNING" ELSE IF Y>60 THE
N X$="SHOCKING GRASP" ELSE IF Y>
40 THEN X$="LEVITATION" ELSE IF
Y>20 THEN X$="INVISIBILITY" ELSE
 X$="FLYING"
335 PRINT@130,X$:GOTO 400
400 PRINT@385,"HIT 'R' TO ROLL A
NOTHER RING,":PRINT@417,"OR 'Q'
TO QUIT.":K$=INKEY$
410 K$=INKEY$:IF K$<>"R" AND K$<
>"Q" THEN 410 ELSE SOUND 150,1:I
F K$="R" THEN CLS:GOTO 20
415 END
500 Y=RND(100):IF Y=100 THEN X$=
"DOUBLES SPELL LEVELS 4 & 5" ELS
E IF Y>95 THEN X$="DOUBLES SPELL
 LEVELS 1 TO 3" ELSE IF Y>92 THE
N X$="DOUBLES 5TH LEVEL SPELLS"
ELSE IF Y>88 THEN X$="DOUBLES 4T
H LEVEL SPELLS"
510 IF Y>82 THEN X$="DOUBLES SPE
LL LEVELS 1 & 2" ELSE IF Y>75 TH
EN X$="DOUBLES THIRD LEVEL SPELL
S" ELSE IF Y>50 THEN X$="DOUBLES
 SECOND LEVEL SPELLS" ELSE X$="D
OUBLES FIRST LEVEL SPELLS"
520 RETURN
550 Y=RND(100):IF Y=100 THEN X$=
"4000 G.P. MAX." ELSE IF Y>89 TH
EN X$="2000 G.P. MAX." ELSE IF Y
>50 THEN X$="1000 G.P. MAX." ELS
E IF Y>25 THEN X$="500 G.P. MAX.
" ELSE X$="250 G.P. MAX."
560 RETURN
600 Y=RND(100):IF Y>97 THEN X$="
+6 AC - +1 SAVING" ELSE IF Y>91
THEN X$="+4 AC - +2 SAVING" ELSE
 IF Y=91 THEN X$="+3 - 5' RADIUS
" ELSE IF Y>83 THEN X$="+3" ELSE
 IF Y=83 THEN X$="+2 - 5' RADIUS
" ELSE IF Y>70 THEN X$="+2" ELSE
 X$="+1"
610 RETURN
```


™TRS80 color

From the January 1981 issue of the CSRA Computer Club newsletter.

> There was some amusement at the November meeting when the Radio Shack representatives stated that the software in the ROM cartridges could not be copied. This month's 68 Micro Journal reported they had disassembled the programs on ROM by covering some of the connector pins with tape. They promise details next month. Never tell a hobbyist something can't be done! This magazine seems to be the only source so far of technical informations on the TRS-80 color computer™. Devoted to SS-50 6800 and 6809 machines up to now, 68 Micro Journal plans to include the TRS-80 6809 unit in future issues.

NOTE: This and other interesting and needed articles for the Radio Shack TRS-80 color computer™ are being included monthly in 68 Micro Journal—The Largest specialty computer magazine in the world!

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Currently, and even before the Color Computer™ hit the stores, **68 Micro Journal™** was devoting more space to the TRS-80C Color Computer™ and information concerning the Motorola 6809 (which is the CPU in the Color Computer™) than ANY OTHER Computer Magazine. Examples include:

REVIEWS of the three major Disk Control Systems for the Color Computer™, most of the Monitors, Assemblers, and Disassemblers, Word Processors and Editors, "Terminal" Programs (for use with Modems, Communications with other Computers, etc.), and of course, Games.
HINTS for Expanding Memory, Power Supply Cooling, repairing sticky keyboards, disabling the ROM PAK "Take Over", hooking up to Printers, etc.
DISCUSSIONS of the 6883 Synchronous Address Multiplexer, using the Color Computer™ with 64K and 96K memory (which it is ALREADY capable of handling), thoughts on Programming, etc.

I suggest that you subscribe to **68 Micro Journal™**, SOON, as many back issues are sold-out.

We still, and will continue to, lead in the type information you need to **FULLY UTILIZE** the **POWER of the 6809 in the Radio Shack TRS-80 Color Computer™.**

Bob Nay
Color Computer Editor

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Utility...

Disk File Helps You Keep Track Of Everything

By E. P. Rutledge

I was very impressed with the *DIRECTORY LISTER* program by Charles Roslund in the March issue of *the RAINBOW*. The first listing here is identical to that one, but the format of the printed page has been changed to accomodate multiple disk listings.

If you think that is being a copycat to get a listing published in a journal, hold on a minute. This new version of an already excellent program also writes an output record to be used by the second listing here, *FILELIST*.

As with Mr. Roslund's program, the disk with which you wish to create a directory should be in Drive 0. A "scratch" disk should be in Drive 1, formatted and blank. If you do not have two disk drives, Lines 21 and 259 can be changed to write a tape for input to the program.

The following steps should run the first program correctly:

- Load the modified *DIRECTORY LISTER* program and make sure the printer is connected and on line.
- RUN the program and the printer should move to the top of form (top of the page).
- The program will ask you for the current date. Since this is a string, you can enter it in any way you choose (July 4 1776, 7/4/76, etc.)
- From this point on, the program will run as before. You can continue loading and listing disks until you are finished—or pooped out.
- To end cleanly, when all disks have been listed, enter END when prompted for the disk name.
- The program will close the open files and terminate.

The scratch file, FILEREC/DAT, will remain on the scratch disk for the execution of the *FILELIST* program.

FILELIST picks up the FILEREC/DAT file created by the modified *DIRECTORY LISTER* program, sorts, and produces a nice, cleanly formatted reference list of files, showing on which disk they reside.

The program first asks the input file name (respond with FILEREC/DAT) and the current date, which I find useful in keeping track of the most current status of the list. Next it displays the possible sort fields and combinations for your choice. Since MID$ is used to pick up the sort, the guide will tell you the position of the starting field width (#CHRS). Upon reading the input file, the program will sort, build a sorted file, read the sorted file and output the printed report.

This program uses a Bubble Sort in BASIC and is either fast or slow depending on the number of records (informative, eh?). My experience has been that the 80C will sort less than 100 records quite quickly, begin to slow with 125 records and give you time for a leisurely snack with 200. If you want it to sort 500 records with this routine, better plan on a weekend.

Since this program was somewhat "quick and dirty" in nature, I simply go somewhere else when I have a large number of files to sort (the number grows and grows, mysteriously). I have developed a sort/merge approach which will sort 500 records in about 18 minutes clock time, however, the editor informs me that there are a couple of machine language sort routines in the works. We really need a good, flexible machine language sort for the 80C. I'm looking forward to it and will merge it into the *FILELIST* Bubble Sort as soon as it is available.

(Programming note: In Line 60 of Listing 1, the modified *DIRECTORY LISTER* program, users without an Epson printer should eliminate the CHR$(27)CHRS(69); instruction before the word "DISK" is to be printed.)

(EDITOR'S NOTE: Dr. Rutledge is correct. We have plans to publish a comprehensive ML sort routine and one is available from ML=US'R Software, 115 Rising Sun, Ft. Mitchell, KY 41017, as well. Watch for a review of the latter.)

Listing 1

```
10 ' ***DIRECTORY LISTER ***
15 ' ***BY C ROSLUND     ***
20 CLEAR 1500:DIMGR(68):LK=0:PRI
NT#-2,CHR$(12);
21 OPEN"O",#2,"FILEREC/DAT:1"
25 INPUT"CURRENT DATE";DATE$
30 FT$(0)="BASIC PROGRAM":FT$(1)
="BASIC DATA"
40 FT$(2)="MACHINE LANGUAGE":FT$
(3)="SOURCE CODE"
50 AF$(0)="BINARY":AF$(1)="ASCII
"
55 IF LK<50 THEN 60
56 LK=0 : GOSUB 600
60 PRINT#-2:INPUT"DISK NAME";D$:
PRINT#-2,TAB(15)CHR$(27)CHR$(69)
;"DISK ";D$;" - ";DATE$:PRINT#-2
,CHR$(27)CHR$(70):LK=LK+3
61 IF D$="END" THEN 603
69 IF LK>63 GOSUB 600
70 PRINT#-2,TAB(5)"NAME/EXT";TAB
(21)"TYPE";TAB(38)"FORMAT";TAB(4
7)"GRANULES";TAB(59)"START,END,E
XEC":LK=LK+1
79 IF LK>64 GOSUB 600
80 PRINT#-2,TAB(3)STRING$(12,"=")
;TAB(18)STRING$(16,"=");TAB(38)
STRING$(6,"=");TAB(47)STRING$(8,
"=");TAB(58)STRING$(17,"="):LK=L
K+1
89 DN=0
90 DSKI$ DN,17,2,A$,B$:FB$=LEFT$
(A$,68)
100 FORI=1TO68:GR(I-1)=ASC(MID$(
FB$,I,1)):NEXT I
110 FOR X=3TO11
120 DSKI$ DN,17,X,AA$,BB$
130 AA$=AA$+LEFT$(BB$,120)
140 FORN=0TO7
150 NA$=MID$(AA$,N*32+1,8):EX$=M
ID$(AA$,N*32+9,3):GR=ASC(MID$(AA
$,N*32+14,1))
160 FG=GR
170 FT$=MID$(AA$,N*32+12,1):AF$=
MID$(AA$,N*32+13,1)
180 IF LEFT$(NA$,1)=CHR$(0) THEN
 270
190 IF LEFT$(NA$,1)=CHR$(255) TH
EN 280
200 AF=ASC(AF$)AND1
210 FORI=1TO68
220 IF GR(GR)<128 THEN GR=GR(GR)
:NEXT I
```

See DISK—Page 32

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DISK—From Page 30

```
230 IF ASC(FT$)=2 THEN 300
239 IF LK>63 GOSUB 600
240 PRINT#-2,TAB(3)NA$+"/"+EX$;T
AB(18)FT$(ASC(FT$));TAB(38)AF$(A
F);TAB(49)1;
250 IF ASC(FT$)=2 THEN PRINT#-2,
TAB(58)"$";BP$;",$";EP$;",$";EA$
;
251 RL=LEN(FT$(ASC(FT$)))
252 IF RL<16 THEN FT$(ASC(FT$))=
FT$(ASC(FT$))+STRING$(16-RL," ")
258 REC$=NA$+"/"+EX$+FT$(ASC(FT$
))+STR$(1)+D$
259 PRINT#2,REC$
260 PRINT#-2:LK=LK+1
270 NEXT N,X
279 IF LK>63 GOSUB 600
280 'PRINT#-2:PRINT#-2,TAB(15)"FR
EE GRANULES:";FREE(0):PRINT#-2:L
K=LK+3
290 GOTO 55
300 LG=GR(GR):LS=LG AND 31:LL=GR
310 LB=ASC(MID$(AA$,N*32+16,1))
320 IF F6<34 THEN TN=INT(F6/2) E
LSE TN=INT(F6/2)+1
330 SN=1+(FG AND 1)*9
340 DSK1$ DN,TN,SN,A$,B$
350 BP=ASC(MID$(A$,4,1))*256+ASC
(MID$(A$,5,1))
360 BP$=HEX$(BP):BP$=STRING$(4-L
EN(BP$),"0")+BP$
370 EP=BP+ASC(MID$(A$,2,1))*256+
ASC(MID$(A$,3,1))-1
380 EP$=HEX$(EP):EP$=STRING$(4-L
EN(EP$),"0")+EP$
390 IF LL<34 THEN TN=INT(LL/2) E
LSE TN=INT(LL/2)+1
400 SN=(LL AND 1)*9+LS
410 DSK1$DN,TN,SN,A$,B$:A$=A$+LE
FT$(B$,127)
420 EA=ASC(MID$(A$,LB-1,1))*256+
ASC(MID$(A$,LB,1))
430 EA$=HEX$(EA):EA$=STRING$(4-L
EN(EA$),"0")+EA$
440 GOTO 240
600 PRINT#-2,CHR$(12)
601 IF LK>50 THEN IF LK<65 THEN
PRINT#-2,TAB(15),CHR$(27);CHR$(6
9);LEFT$(D$,8),' CONTINUED':PRIN
T#-2,CHR$(27)CHR$(70)
602 LK=0:RETURN
603 END
```

Listing 2

```
10 'PROGRAM TO SORT AND LIST CAT
ALOG OF DISK FILES
20 'WRITTEN BY EP RUTLEDGE FOR R
ESEARCH ASSOCIATES - 24 APR 82
30 'BASED UPON IDEA GIVEN BY C R
OSLUND IN "DIRECTORY LISTER"
40 CLEAR 20000:CLS
50 FOR JX=1 TO 5:SOUND 128,1:NEX
T JX
55 INPUT"ENTER FILENAME/EXT";D$
56 D$=D$+":1"
60 INPUT"CURRENT DATE";DATE$
61 PRINT"DATA FIELDS ARE:","NAME
 1-8 (8CHRS)","EXTENSION 10-12 (
3CHRS)","NAME/EXT 1-12 (12CHRS)"
,"TYPE 13-29 (16CHRS)","NAME/EXT
 TYPE 1-29 (29CHRS)"
62 INPUT"FIELDS FOR FILE SORT (B
EG,WDTH)";B,W
70 DIM T$(800)
80 OPEN "I",1,D$
90 PRINT:PRINT"READING ";D$
100 X=X+1:LINEINPUT#1,T$(X)
110 IF EOF(1) =-1 THEN 120 ELSE
100
120 PRINT X;" RECORDS READ":CLOS
E#1:PRINT:PRINT"SORTING"
130 TIMER=0
140 FOR J=1TOX
150 FOR K=J TO X
160 IFMID$(T$(J),B,W)<MID$(T$(K)
,B,W) THEN 180
```


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```
170 TEMP$=T$(J):T$(J)=T$(K):T$(K
)=TEMP$
180 NEXT K:NEXT J
190 TI=INT(TIMER/3600):T2=INT((T
IMER-(TI*3600))/60)
200 PRINT:PRINT"SORT FINISHED";T
I;"MIN";T2;"SECS"
210 FOR JX=1TO 10:SOUND 200,1:NE
XT JX
220 PRINT:PRINT"WRITING SORTED "
;"FILEREC/DAT"
230 OPEN "O",1,"FILEREC/SRT:1"
240 FOR JK=1TO X
250 IF T$(JK)="" THEN 240
260 PRINT#1,T$(JK)
270 NEXT JK
280 CLOSE
281 X=61:DATE$="25 APR 82"
285 OPEN"I",#1,"FILEREC/SRT:1"
290 PT=INT((X/54)+.9999999):PK=0
291 PK=PK+1:LK=0
300 PRINT#-2,CHR$(27)CHR$(69)CHR
$(12)CHR$(13)CHR$(13)TAB(10)DATE
$;TAB(31)"FILE DIRECTORY";TAB(59
)"PAGE ";PK;" OF ";PT;CHR$(13)CH
R$(13)CHR$(27)CHR$(70)
310 PRINT:PRINT:PRINT#-2,TAB(7)"
NAME/EXT";TAB(26)"TYPE";TAB(38)"
GRANULES";TAB(50)"DISK";TAB(63)"
COMMENTS":LK=LK+7
320 PRINT#-2,TAB(5)STRING$(12,"=
");TAB(20)STRING$(16,"=");TAB(38
)STRING$(8,"=");TAB(50)STRING$(4
,"=");TAB(57)STRING$(20,"="):LK=
LK+1
330 IF EOF(1) = -1 THEN 380
340 LINEINPUT#1,REC$:RL=LEN(REC$
)-31
350 IF LK>=62 THEN 291
360 PRINT#-2,TAB(5)MID$(REC$,1,1
2);TAB(20)MID$(REC$,13,16);TAB(4
1)MID$(REC$,30,RL);TAB(51)RIGHT$
(REC$,2):LK=LK+1
370 GOTO 330
380 CLS:INPUT"DO YOU WANT D$ SAV
ED (Y/N)";Y$:IFY$="N" THEN ! D$
390 PRINT:INPUT"DO YOU WANT  FIL
EREC/SRT  SAVED (Y/N)";Y$:IF Y$=
"N" THEN KILL "FILEREC/SRT:1"
400 END
```


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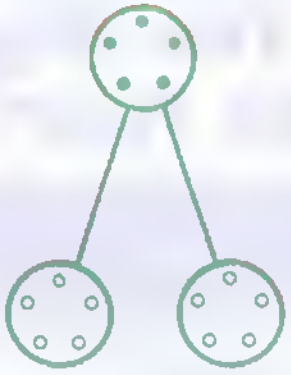

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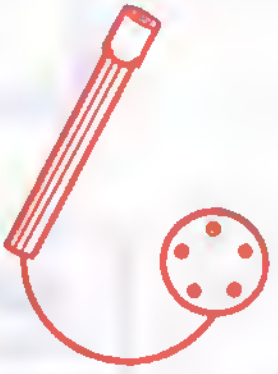

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PIPELINE

Sure, you know the 80C is on sale this month for $299 for the 4K version. And a number of you have called with the information that our favorite computer will soon no longer be available in a 4K version.

But did you know that what was the biggest bargain in personal computing is soon going to be an even bigger bargain. We have long said that buying a 4K computer of the quality of the 80C for $399 was a super good deal. Well, shortly, that same $399 will buy not a 4K, but a 16K version of the 80C. The Extended Basic upgrade will go for just $100 more. So, the truth of it all is that there is *no* personal computer on the market with so much available for so little (money, that is).

But that isn't all that reaches the end of *the Pipeline*. We also hear that before long there will be a 64K version of the Color Computer available. Price is unknown at present, (maybe $750?) but sources tell us that the model number (in case you want to get your hands on one early) will be 26-3005.

And speaking of hardware, the end of this month should see a sale on the Line Printer VII. We hear the cost will go down to $299. That's hard to beat for a dot-addressable graphics printer, even if the machine isn't really capable of handling two- and three-part forms. Actually, we were able to handle two-part NCR forms quite well on out LP VII.

Yes, there is more news. Software from Tandy will soon be (or may already have in your area) taking the form of tape as well as ROM Pack. Two of Tandy's most popular Model I/III Adventures, including *PYRAMID*, will be available for the 80C. Also, a new program called *BEDLAM*. And, there are some other things coming, too, such as a game called *WILDCATTING*, another named *POPCORN* and one styled as *GALACTIC ATTACK*.

* * * * * *

Speaking of software, the hottest things going these days seem to be editor/assemblers and macro assemblers. We've reviewed several of these, including the SDS-80C from the Micro Works and the system available from Cer-Comp. Now, we understand, there are Macro Assemblers available from Computerware, the Micro Works and the long-awaited editor-assembler from Tandy has reached at least some stores. We plan a takeout on all these products shortly, so keep reading *the RAINBOW*.

* * * * * *

On the subject of the review process, we've been doing reviews for a year now and, finally, someone struck back. The latest issue of *CHICATRUG*, the Chicago TRS-80® user's group newsletter, carried a review on *the RAINBOW* last month. Eben Kent called us "a valuable source" and his only complaint seemed to be that we didn't have a Table of Contents. We have one now, of course (and this month, a colorful one as well!)

And, too, we have also been mentioned in several magazines "Down Under" in Australia. One of those, *Electronics Australia*, said the **RAINBOW** was "very well presented and packed with ideas for Colour Computer users."

* * * * * *

We received a letter the other day from a reader who wanted us to list out all the articles which appear each month on the 80C. Well, that's a job in itself, and while you'll find more in **the RAINBOW** than in just about every other magazine combined, it would still be quite a task to keep up with it all. Fortunately, for those of you who want that sort of information, there is a new magazine called **COMPendium** which can be had by writing Epicurious, P.O. Box 129, Lincolndale, NY 10540. Subscriptions are $18 a year in the U.S. and $20 in Canada.

* * * * * *

By the way, the space invaders game reviewed on these pages in June from Space Cadet Enterprises has been sold to Mark Data Products. It is to be re-released soon—after a few changes are made.

* * * * * *

We were asked the other day whether we thought there would be a new keyboard available for the 80C at any time in the future. One is available now, a way to plug in a Model I keyboard into the Color Computer. Frankly, we like the 80C's keyboard personally. The short keystrokes make it easier to operate, to our mind, than the "deeper" keyboards on many other computers.

But, yes, there are a lot of new things happening, and they will be available soon. One thing we hear is that a couple of manufacturers are working on joysticks more like those you get with an Atari video game. Also, as you know, there is already one light pen on the market, but a couple of more are in the final stages of production. We hear that the holdup on the other light pens is simply one of developing software to go with the hardware. And, there is also a ROM Pack extended board now available (its actually a cable) which makes it easier for you to plug ROM Packs—and your disk drive interface—into the expansion slot simply because you don't have to make room for the pack sticking out if you have cramped quarters.

All of this information is by way of saying that there are a heck of a lot of things available for the 80C and more on the way. Fantastic when you consider that the computer itself is only a little more than 18 months old!

And the newest area we see the Color Computer moving into is business-related software. We have received several inquiries about programs like a general ledger, accounts payable and the like. Gee, a general ledger on a "game machine?" How 'bout them apples?

* * * * * *

Jorge Mir has compiled a list of all hardware and software avaliable for the 80C, and it can be accessed from a data tape using the *UNIDATFL* program which appeared in last month's issue of *the RAINBOW*. The program is also included on the tape, which can be purchased for $9.95, plus $1.25 postage and handling, from Jorge at 12851 W. Balboa Drive, New Berlin, WS 53151. This information is offered as a service to readers of *the RAINBOW*.

* * * * * *

We feel it is important to remind you that the U.S. Postal Service will not forward third class mail, such as *the RAINBOW*. So, if you move and don't get us a new address in time, you may miss an issue. New address information should be in by the 15th of the month for the next month's issue.

Also, please be patient with our friends at the Postal Service. Wait until the 25th of the month before writing us to say that you have missed a month's issue. We *will* send you another one first class mail—but we cannot do that if you missed an issue because your address changed and you didn't notify us. By the way, we have several magazines returned each month for various reasons, so be sure your address is correct.

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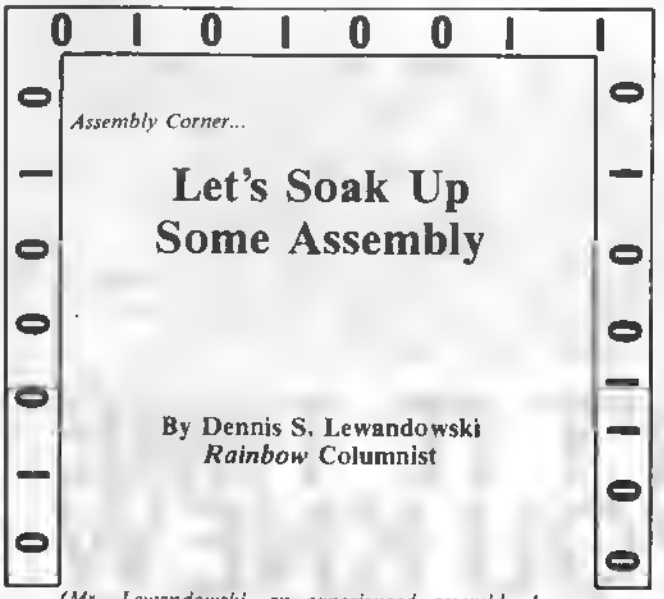


Assembly Corner...

Let's Soak Up Some Assembly

By Dennis S. Lewandowski
Rainbow Columnist

(Mr. Lewandowski, an experienced assembly language programmer and teacher, is President of DSL Computer Products.)

Last month you got your feet wet in Assembly Language. This month, you're going to get a soaker!

First of all, you may have noticed I have not bothered to explain how any specific editor/assembler works. I feel that the job of doing that is up to the package that you purchase. And, there are a number of excellent editor/assemblers on the market—in tape, on disk and in ROM packs. They range in all sorts of prices, starting at $6.95. So, what's your excuse?

At the end of last month's rendition of *The Assembly Corner*, I left you with a challenge, or homework if you care to call it that. I asked you to play with the simple block memory move. Did you?

If the answer is a truthful "yes," give yourself an A+. If not, well, what can I say?

If you will look at Program Listing 1, you will see how easy it was to modify the program to make it search for a particular byte in memory. But, what does that have to do with the information it has gathered? Nothing, hmmm!

Listing 1

```
START LDY   #$A000 LoaD Y with ROM
LOOP  LDA   ,Y+    LoaD A with Y pointer
      CMPA  #$AB   See if a match found
      CMPY  #$B000 Done with the search?
      BEQ   DONE   YES then DONE
      BRA   LOOP   NO than LOOP
DONE  JMP   $A027  GOTO BASIC
```

Let's improve this a little bit. Before you start programming, you should write down your plan of attack. Attack *what*? The problem. The reason you are writing the program in the first place. I wouldn't want a house, car or anything, for that matter, that wasn't built with a plan. So, we must have a plan to build a program.

Always *start* at the beginning (makes sense to me). Define what is going to be done. So, in this case, say to yourself, "OK, I want a program which will search memory for a byte and display the address on the screen."

Fine! But, one question comes to mind: Will you write 256 programs to search each byte possible? Of course not!

What you want to do is to type in the one byte you want to search for. Well then, put that in your plan too. Anything else? Not right now. Then, let's get started.

Most programs are a collection of subroutines, with the main body of the code acting as a sort of supervisor, selecting which subroutine should be called up next. So, let's think about what subroutines we need to get this program written.

We'll need subroutines that:

—Get a HEX input for the byte we want to locate.

—Display the memory location on the screen.

I hate to interrupt your train of thought, but are we going to search all memory every time? Gee, good thing we're writing this plan down with a *pencil*.

—Get a HEX input for the start and the end of the search memory.

—Hold the display so we can see it, just in case we fill the screen.

That's not the best plan I've seen, but its good enough to get started. The next logical step would be to flow chart the program. However, in the interest of space, we'll move right along and get the subroutines written.

First of all, we have to get four inputs for the start of the search location. Let's call that subroutine INFOUR. Rather than waste space, we'll label it halfway, INTWO—for the two byte input we'll need.

If you peek at Listing 2, you will see what we call error trapping. This is in case someone presses the wrong key. Also, let's include a little escape route, if you press "X" then we start over.

Most of this program is code to get the start and end inputs. The portion labeled LOP1, for LOOP 1, is the entire searching part.

Now comes the fun part—getting it to the screen. Once we have found a match, we go to a routine labeled FOUND. From here we do all sorts of things like keep the screen neat, print the current location of "Y" and so on.

I have placed comments on almost every line in *lowercase*. If you study what is being done in the instructions, and the

Listing 2

```
PAGE 0001      THE MICRO WORKS      BYTETREK
0002 0E00                         NAM BYTETREK
0003 0009           SCNMEM EQU $09      cursor position
0004 001B           VAR    EQU $1B      temp. storage
0005 001D           STRMEM EQU $1D      start loc.
0006 001F           ENDMEM EQU $1F      end loc.
0007 001A           COUNT  EQU $1A      number of matches
0008 0E00 BDA928    START  JSR $A928    cls
0009 0E03 4F               CLRA         zero a
0010 0E04 971A             STA COUNT    store it
0011 0E06 8E0EF5           LDX #MES1    point at mes1
0012 0E09 BD0EA9           JSR OUTA     print it
0013 0E0C 8D3A             BSR INFOUR   get start loc.
0014 0E0E 9E1B             LDX VAR      loc. from var
0015 0E10 9F1D             STX STRMEM   put in start
0016 0E12 8E0F07           LDX #MES2    point at mes2
0017 0E15 BD0EA9           JSR OUTA     print it
0018 0E18 8D2E             BSR INFOUR   get end loc.
0019 0E1A 9E1B             LDX VAR      loc. from var
0020 0E1C 9F1F             STX ENDMEM   put in end
0021 0E1E 8E0F17           LDX #MES3    point at mes3
0022 0E21 BD0EA9           JSR OUTA     print it
0023 0E24 0C09             INC SCNMEM   move cursor
0024 0E26 BD0E54           JSR INTWO    request byte
0025 0E29 961C             LDA VAR+1    get search byte
0026 0E2B B70E3B           STA SPC      put it in place
0027 0E2E 109E1F           LDY ENDMEM   get end loc.
0028 0E31 10BF0E40         STY SEND     put in place
0029 0E35 109E1D           LDY STRMEM   get start loc.
0030 0E38 E6A0      LOP1   LDB ,Y+      start looking
0031 0E3A C1               FCB $C1      cmpb inst. code
0032 0E3B 00        SPC    FCB 0        search byte here
0033 0E3C 2764             BEQ FOUND    found a match?
0034 0E3E 108C             FDB $108C    cmpy inst..code
0035 0E40 0000      SEND   FDB 0        endmem goes here
0036 0E42 102C010A         LBGE FINISH  done?
0037 0E46 20F0             BRA LOP1     no keep looking
0038 0E48 8D1C      INFOUR BSR INHEX    if you use any
0039 0E4A 8D50             BSR MSNHEX   code more than
0040 0E4C 971B             STA VAR      twice just make
0041 0E4E 8D16             BSR INHEX    it a sub-rout'n
0042 0E50 9A1B             ORA VAR      and call it up
0043 0E52 971B             STA VAR
0044 0E54 8D10      INTWO  BSR INHEX    get hex key
0045 0E56 8D44             BSR MSNHEX   break it into
0046 0E58 971C             STA VAR+1    nibbles. store
```

```
0047 0E5A 8D0A              BSR INHEX       in a safe place
0048 0C5C 9A1C              ORA VAR+1       and call as you
0049 0C5C 971C              STA VAR+1       need them.
0050 0E60 860D              LDA #$0D        loada w/cr
0051 0E62 BDA30A            JSR $A30A       print it
0052 0E65 39                RTS             return
0053 0C66 BDA1B1      INHEX JSR $A1B1       inkey$ w/cursor
0054 0C69 8130              CMPA #$30       zero?
0055 0C6B 2D20              BLT WHAT        if less error
0056 0C6D 8139              CMPA #$39       more than 9
PAGE 0002    THE MICRO WORKS .  BYTETRCK
0057 0E6F 2E02              BGT RLPHA       could be A-F
0058 0C71 200C              BRA OUTI        if not use it
0059 0C73 8141        ALPHA CMPA #$41       A maybe?
0060 0C75 2D16              BLT WHAT        if less error
0061 0C77 8158              CMPA #$58       if X then goto
0062 0E79 1027FF83          LBEQ START      start again
0063 0C7D 8146              CMPA #$46       maybe F?
0064 0E7F 2E0C              BGT WHAT        if more error
0065 0EB1 BDA30A      OUTI  JSR $A30A       first print it
0066 0C84 8030              SUBA #$30       strip off ascii
0067 0C86 8109              CMPA #9         if 9 or less
0068 0E8B 2F02              BLE DONE        then done
0069 0E8A 8007              SUBA #7         if not sub 7 more
0070 0E8C 39          DONE  RTS             return to main
0071 0E8D BE0E96      WHAT  LDX #MES5       point at mes5
0072 0E90 BD0EA9            JSR OUTA        print it
0073 0E93 16FF6A            LBRA START      and restart
0074 0C96 57484154    MES5  FCC "WHAT
0075 0E9A 0D00              FDB $0D00       c/r and zero
0076 0E9C 5F          MSNHEX CLRB           empty the carry flag
0077 0E9D 49                ROLA            roll A until the
0078 0E9E 49                ROLA            most significant
0079 0E9F 49                ROLA            nibble is in the
0080 0EA0 49                ROLA            last 4 bits
0081 0EA1 39                RTS             and return
0082 0CA2 0C1A        FOUND INC COUNT       found one
0083 0EA4 BD0CD7            JSR PRINTY      print Y on scn
0084 0CA7 20BF              BRA LOP1        and go back
0085 0CA9 A680        OUTA  LDA ,X+         load A with (X)
0086 0CAB BDA30A            JSR $A30A       put on screen
0087 0EAE 8100              CMPA #0         is it a zero?
0088 0EB0 2702              BEQ G0          if so stop
0089 0EB2 20F5              BRA OUTA        if not do more
0090 0EB4 39          G0    RTS             go back when done
0091 0EB5 8620        DBLSPC LDA #$20       load A w/space
0092 0EB7 8D1A              BSR DX          put on screen
0093 0EB9 8620              LDA #$20        do it again
0094 0EBB 2016              BRA DX          and go to main
0095 0CBD 971C        HCXOUT STA VAR+1      store it
0096 0CBF 44                LSRA            move those nibbles
0097 0CC0 44                LSRA            where they belong
0098 0CC1 44                LSRA            one byte take two
0099 0CC2 44                LSRA            places on the screen
0100 0CC3 BD04              BSR OUTA1       print the MSN
0101 0CC5 961C              LDA VAR+1       get the value
0102 0EC7 840F              ANDA #$0F       strip the msn
0103 0EC9 8109        OUTA1 CMPA #$09       if 9 or less
0104 0ECB 2E04              BGT M0
0105 0CCD 8B30              ADDA #$30       make ascii
0106 0CCF 2003              BRA DX          and display it
0107 0ED1 8B37        M0    ADDA #$37       make alpha
0108 0ED3 BDA30A      DX    JSR $A30A       display it
0109 0CD6 39                RTS             go back again
0110 0CD7 3420        PRINTY PSHS Y         copy Y on the stck
0111 0ED9 3506              PULS D          put Y in D
PAGE 0003    THE MICRO WORKS    BYTCTRCK
0112 0CDB 5A                DECB            dal auto-inc
0113 0CDC 8D0F              BSR HEXOUT      put A on scrn
0114 0EDC 1C89              CXD A,B         swap A & B
0115 0EC0 8D08              BSR HCXOUT      put A on scrn
0116 0CC2 8DD1              BSR DBLSPC      keep it neat
0117 0EEA D61A              LDB COUNT       is line full?
0118 0CC6 C105              CMPB #$5        let's see
0119 0CC8 2701              BEQ LNFECD      if so do c/r
0120 0EEA 39          Y0    RTS             done go back
0121 0EEB 860D        LNFECD LDA #$0D       put c/r in A
0122 0EED BDA30A            JSR $A30A       put on screen
0123 0CF0 5F                CLRB            zero B
0124 0CF1 D71A              STB COUNT       zero count
0125 0EF3 20F5              BRA Y0          routine done
0126 0CF5 5354415254  MES1  FCC "START LOC. (HCX)
0127 0F05 2000              FDB $2000
0128 0F07 454C44204C  MES2  FCC "END LOC. (HEX)
0129 0F15 2000              FDB $2000
0130 0F17 5748494348  MES3  FCC "WHICH BYTE (HEX)
0131 0F27 2000              FDB $2000
0132 0F29 0D          MES4  FCB $0D
0133 0F2A 5052455353        FCC "PRESS S TO RCSTART,
0134 0F30 20414E5920        FCC " ANY OTHER TO END
0135 0FAE 0D00              FDB $0D00
0136 0F50 8C0F29      FINISH LDX #MCS4      point at mes4
0137 0F53 BD0EA9            JSR OUTA        print it
0138 0F56 B0A1C1      F0    JSR $A1C1       wait for a key
0139 0F59 27FB              BEQ F0          press
0140 0F5B 8153              CMPA #$53       was it S
0141 0F5D 1027FC9F          LBEQ START      if so restart,
0142 0F61 7CA027            JMP $A027       no go to basic
0143 0F64                   END START
NO ERRORS FOUND
```

corresponding comments, you should have no trouble figuring out this program. A lot more than indexed addressing is being used here, and its all worth knowing. With some study, this should keep you busy until next month.

I'll see you then.

Software Review:...

MUSIC Gives Fun And Some Frustration Too

All in all, we like *MUSIC* very much, but it has one frustrating element that causes a bunch of problems for us.

The program will do just about everything you could want it to do, from using both trebel and bass lines to allowing you to "slur" notes—to give you a taaaah rather than ta-ta-ta as with the PLAY and SOUND commands when entering specific notes from the score.

And this program is excellent for children, or for those who really can't read music. It reinforces, aurally and visually, the input you make from the keyboard with an attractive screen display and a beeping of the note as it goes into memory. Further, it shows you the note on the staff—and the rests, too—which really helps if you cannot read music.

In short, when writing or copying music, *MUSIC* is a very worthwhile program. It amuses and teaches. And, from that standpoint, I helps a great deal.

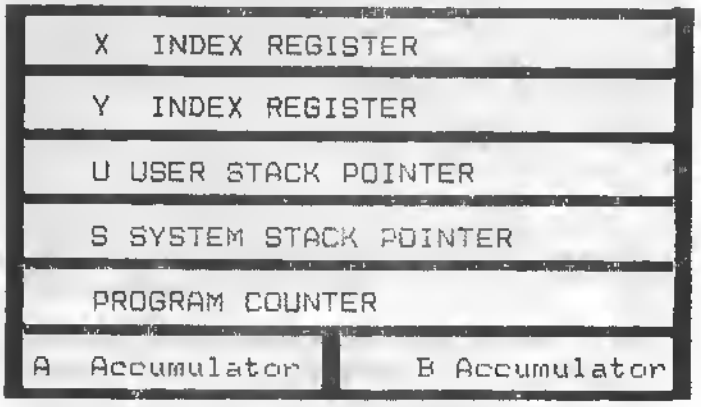
But the overwhelmingly frustrating thing about *MUSIC* is that it runs only in its own environment, as best we can tell. If what you want to do is create music for merging with another program—say one you have written—that's not possible. Durn and double durn. It would really be an excellent feature to have available. Yes, you can save music to tape and play it back. But you cannot convert it for use with something else.

If this is not your thing, this is a good program which will be a great deal of fun to work with.

(Radio Shack, available at stores and computer centers, $29.95)

We Forgot To Assemble This One!

The May isssue of **the RAINBOW** Assembly Corner column referred to a drawing of the CPU registers. . .but we forgot to include the drawing. It is reproduced below. Sorry for any trouble this may have caused:



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5	NUMBER GUESS	DICE ROLL
6	IN-BETWEEN	SHELL GAME
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8	MORTAR BATTLE	PUZZLE
9	TEASER	MOUSE
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Software Review...

Katerpiller Attack Is An Excellent Game

Add *KATERPILLER ATTACK* to the list of outstanding adaptations from the arcades to the 80C.

Now, personally, I have always liked the game after which this one is patterened better than I did Space Invaders. There is something about the action, fast and furious though both of them can be, that gets things going better than some of the other games.

So, when *KAPERPILLER ATTACK* arrived the other day, it was out of the package and into the 80C quite quickly. And there was no disappointment—it is good.

The caterpiller, oops, Katerpiller, is there and it does break into pieces when it is hit. Mushrooms abound (maybe *this* is why I like the game so much, I hate mushrooms). There is a spider that hops around and another creature, too. It dive-bombs on you.

KATERPILLER ATTACK is in machine language, so the action is fast, the joystick responds quickly and there are excellent graphics, color and sound. You can quit plunking quarters into the arcade machine, add this program to your library, and not miss a single thing.

(Tom Mix Software, 3424 College N. E., Grand Rapids, MI 49505, $24.95)

Software Review...

Starship Chameleon Offers An Enjoyable New Twist

If you are getting a bit tired of the same old shootme-up games with space ships, alien critters and the like, then *STARSHIP CHAMELEON* has a new twist that brings not only a lot of fun but some good action as well.

The alien critters stay at the top of the screen in this machine language game and what they do is bop back and forth, dropping bombs at the planet below you.

In all, five types of bombs are employed, but the trick of all this is that you can only destroy four of them. And, you do that by changing your starship (hence, chameleon) to the same color as the dropping bombs. If you run over a bomb of the same color, you destroy it. If you run over a bomb of the opposite color, it destroys you.

Additionally, however, there are semi-intelligent aerial mines, which you cannot destroy. They try to home in on you. If they do, your ship is destroyed.

This is not a static game. The starship can move all across and up and down, hunting bombs and changing colors at will. There are also different levels of play, and a nice pause feature that lets you freeze action (to answer the phone or figure things out). The game also displays the top eight scores on the screen and one or two persons can play the game at the same time.

You get points for destroying bombs, and lose them when the bombs hit the planet. The graphics are good, the colors excellent—important since they are an integral part of the game—and the sound realistic.

A well done game with a new twist that you will enjoy.

(Computerware, Dept. C, Box 668, Encinitas, CA 92024, $24.95)

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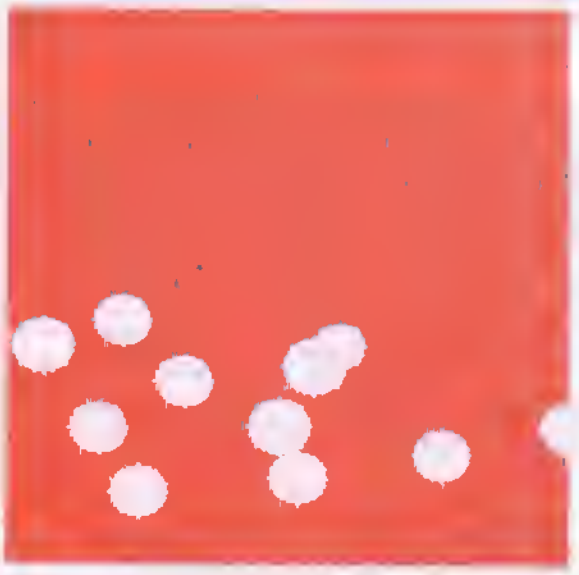
Game...

Is There Any Escape From NO ESCAPE?

16K ECB

Now, from the world of outer space, comes *NO ESCAPE*, where you try to navigate through a meteor field that bars your way from the planet Saturn.

You can never make it to the famed ringed planet Saturn, actually. It just takes too long and there are far too many meteors between Mars and Saturn. They bar your way. If you do manage to get there, you end up in the middle of one of the dense rings of Saturn—where there is no space left at all. Then, you will surely crash.



Pilot Your Way Through This!

Jim Ebbert of Acesoft Software (1680 North Page Dr., Deltona, FL 32725) contributed *NO ESCAPE* for your pleasure. It features some faster animation than is available through pure BASIC since it contains one small machine language subroutine.

To play *NO ESCAPE*, CLOAD and RUN the program. After a brief pause, the title will appear and scroll up the graphic screen. When the title clears, the game will start.

Here are some hints from Jim :

The object of the game is to maneuver your space ship around meteors without crashing. Use the right joystick to control movement.

When *NO ESCAPE* starts, your space ship will appear in the upper part of your screen and blue meteors will come zooming at you. If you crash, your time will be printed on the high resolution screen. After you read your time, press the space bar, type in your name or initials, and press ENTER. The top five scores will be displayed and the theme from *Star Trek* will play. When you have finished reading the high scores, press the space bar again and the game will restart.

As the game goes on, the size and number of meteors will increase as you get close to the dense ring—where there is no space left at all. In order to last as long as possible, you must keep several options open in case your path is blocked off.

Jim says that it is not always a good idea to stay too close to the edge of the screen, since you cannot go from the right of the screen to the left and you can become trapped by meteors without any avenue of escape.

Incidentally, Mr. Sulu, this isn't a shoot-em-up. You can only navigate, not blast the meteors.

Have fun.

```
0 '          NO ESCAPE
1 '        BY JIM EBBERT
2 '
3 '      COMPLIMENTS OF:
4 '     ACESOFT  SOFTWARE
5 '   1680 NORTH PAGE DRIVE
6 '     DELTONA, FL 32725
7 '
10 '
11 '
12 CLEAR:DIM0$(26):PMODE3,1:PCLS
:CLS0:PLAY"V30L255T255":H$(0)="U
10R10D10L10R10BR4":H$(1)="R10L5U
10G5BF5BR9":H$(2)="U5R10U5L10BD1
0R10BR4":H$(3)="R10U10L10R10D5L8
R8D5BR4":H$(4)="BU5U5D5R10U5D10B
R4":H$(5)="R10U5L10U5R10BD10BR4"
13 DATA U4E4F4L8R8D4BR4,U8R7FD2G
L7R7FD2GL7R7BR5,U8R8L8D8R8BR4,U8
R7FD6GL7R7BR5,U8R8L8D4R6L6D4R8BR
4,U8R8L8D4R6L6D4BR12,U8R8D2U2L8D
8R8U4L4R4D4BR4,U8D4R8U4D8BR4,R4U
8L4R8L4D8R4BR4,U2D2R8U8D8BR4,U8D
4R4E4G4F4BR4,U8D8R8BR4,U8F4E4D8B
R4,U8F8U8D8BR4
14 DATA U8R8D8L8R8BR4,U8R8D4L8D4
BR12,U8R8D8L8R6H2F4H2R2BR4,U8R8D
4L8R4F4BR4,R8U4L8U4R8BD8BR4,BR4U
8L4R8BD8BR4,U8D8R8U8D8BR4,BR4H4U
4D4F4E4U4BD8BR4,U8D8E4F4U8D8BR4,
E8G4H4F8BR4,BR4U4H4F4E4BD8BR4,E8
L8BD8R8BR4
15 FORT=1TO26:READO$(T):NEXTT:PM
ODE3,1:PCLS:H$(6)="U10R10L10D5R1
0D5L10BR14":H$(7)="E10L10BR14BD1
0":H$(8)="U10R10D10L10U5R10D5BR4
":H$(9)="R10U10L10D5R10D5BR4"
16 COLOR3:CIRCLE(60,60),60,3,.6,
.25,.75:CIRCLE(60,40),30,3,.5,.7
5,.25:CIRCLE(60,49),40,3,1.2,.1,
.25:LINE(93,74)-(114,20),PSET:LI
NE-(120,95),PSET,BF:LINE(96,70)-
(114,70),PSET
17 DRAW"S4BM+10,+24":R$="CESOFT"
:GOSUB20:TL$(1)="JIM EBBERT":PO(
1)=323:FORT=2TO5:TL$(T)="  ":NEXT
18 FORT=2TO4:COLORT:LINE(0,104+T
)-(255,104+T),PSET:NEXTT
19 GOTO21
```

See ESCAPE—Page 44

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ESCAPE—From Page 42

```
20 L=LEN(R$):FORTY=1TO L:M=ASC(M
ID$(R$,TY,1))-64:IFM=-32THENDRAW
"BR10":NEXTTY:RETURN ELSE DRAWO$
(M):NEXTTY:RETURN
21 FORY=4TO20STEP2:DRAW"S24BM"+S
TR$(Y)+",190C2"
22 R$="N":GOSUB20:NEXT:FORG=4TO1
0:X=70+G:Y=180+G:DRAW"S8BM"+STR$
(X)+","+STR$(Y):R$="O":GOSUB20:N
EXTG
23 FORJ=3TO7:K=ABS((J*16)-230):I
=100+(J*J+(J*6)):DRAW"BM"+STR$(K
)+","+STR$(I)+"C3S"+STR$(J+1):R$
="ESCAPE":GOSUB20:NEXTJ
24 PLAY"V31L255T25505":PMODE4,1:
SCREEN1,1:FORT=1TO99:PLAY"N"+STR
$(RND(12)):NEXTT
25 FORT=13824TO13838:READD:POKET
,D:NEXT:DEFUSR=13824
26 DATA 142,6,63,166,128,167,136
,191,140,30,0,45,246,57,36
27 PMODE3,1:SCREEN1,0:FORT=1TO7:
K=USR(I):IFT=1THENLINE(0,191)-(2
55,191),PRESET
28 NEXT:LINE(0,191)-(255,178),PR
ESET,BF:PLAY"V26L29T9":DRAW"BM50
,191C4S4":R$="BY JIM EBBERT":GOS
UB20:FORO=1TO5:FORT=1TO12:PLAY"O
"+STR$(O)+"N"+STR$(T):NEXTT,O:PL
AY"V31L1T1":FORK=1TO2:FORI=2TO4:
DRAW"BM50,191S4C"+STR$(I):R$="BY
 JIM EBBERT":GOSUB20:NEXTI,K
29 GOSUB67:FORT=1TO999:NEXTT:PMO
DE1,1:PCLS:SCREEN1,0:DRAW"BM128,
0C2":J=128:TIMER=0:HJ=0:KL=8:G=1
0:PLAY"V31L255T25503"
30 A=RND(250)+3:GOSUB43:IFPPOINT
(A,B)=3THEN30 ELSE CIRCLE(A,B),K
L,3:PAINT(A,B),3,3
31 GOSUB36:K=USR(I):J=J+JOYSTK(0
)/8-4:GOSUB32:PSET(J,8):R=R+1:IF
R>G THENR=0:GOTO30ELSE31
32 IFJ<1THENJ=1
33 IFJ>255THENJ=255
34 IFPPOINT(J,9)=3THEN40
35 RETURN
36 IFHJ/98=INT(HJ/98)THENG=G-1
37 IFHJ/110=INT(HJ/110)THENKL=KL
+1
38 HJ=HJ+1
39 RETURN
40 TI=TIMER:FORT=1TO180STEP4:CIR
CLE(J,18),T,4:PLAY"V31L255T25503
N"+STR$(RND(12)):NEXTT:FORN=5TO1
STEP-1:PLAY"V31L255T255O"+STR$(N
)+"N12N11N10N9N8N7N6N5N4N3N2N1":
NEXTN
41 PMODE3,1:PCLS:SCREEN1,0
42 GOTO45
43 IFKL<12THENB=RND(100)+70ELSE
B=160-KL
44 RETURN
45 DRAW"BM1,20C3S8":R$="YOU LAST
ED":GOSUB20:R$="FOR":DRAW"BM1,40
```


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```
":GOSUB20:H=INT(TI/60):UI=INT(H/
60):DRAW"BM1,80S4C2":GOSUB48:UI=
H-(UI*60):DRAW"BM90,80S8":R$="MI
NUTES":GOSUB20:DRAW"BM1,110S4":G
OSUB48:R$="SECONDS":DRAW"S8BM90,
110":GOSUB20
46 JU$=STR$(H)+" "+STR$(UI):IFIN
KEY$=" "THEN51
47 GOTO46
48 T$=MID$(STR$(UI),2,LEN(STR$(U
I)))
49 FORT=1TO LEN(T$):M=VAL(MID$(T
$,T,1)):DRAWH$(M):NEXTT
50 RETURN
51 PCLS:SCREEN1,0:DRAW"C2BM20,30
S4":R$="TYPE IN YOUR NAME":GOSUB
20:DRAW"BM20,50C2":TL$=""
52 A$=INKEY$:IFA$=""THEN52ELSE I
F ASC(A$)=13THEN56
53 IFA$<"A" OR A$>"Z" THEN IFA$<
>" "THEN52
54 R$=A$:TL$=TL$+A$:GOSUB20:IFLE
N(TL$)>10THEN56
55 GOTO52
56 PO=H:IFPO>PO(5)THENTL$(5)=TL$
:PO(5)=PO:GOSUB63
57 PMODE3,1:PCLS:SCREEN1,0:PO$=J
U$
58 DRAW"BM4,20C3S8":R$="TOP SCOR
ES":GOSUB20:DRAW"BM4,50C2S4":CE$
="BD14BL255BR4"
59 FORT=1TO5:R$=TL$(T):GOSUB20:G
OSUB62:DRAWCE$:NEXTT:GOSUB69
60 CIRCLE(RND(255),RND(40)+151),
RND(18),RND(3)+1,RND(0)*2:IFINKE
Y$=""THEN60
61 GOTO29
62 DRAW"BR255BL30":T$=(MID$(STR$
(PO(T)),2,3)):L=LEN(T$):GOSUB65:
FORO=1TO L:DRAW"BL16":NEXT:FORY=
1TO L:P=VAL(MID$(T$,Y,1)):DRAWH$
(P):DRAW"BR6":NEXTY:RETURN
63 FORI=4TO1STEP-1:IFPO>PO(I)THE
NTL$(I+1)=TL$(I):PO(I+1)=PO(I):T
L$(I)=TL$:PO(I)=PO
64 NEXTI:RETURN
65 IFL<3THENT$="0"+T$:L=LEN(T$):
GOTO65
66 RETURN
67 FORT=13824TO13838:IFPEEK(T)=3
0THENPOKET,18
68 NEXTT:RETURN
69 PLAY"T6V31L202G03L2.FL6EDC02B
L2B-L1B-L2GL2.03GL6FEDC02L2BL1BL
4B-L2.AL4BL603C#DEF#GL2AL1.B-02L
2.B-03L4CL6DE-FG-AL2B-L1B02L2G03
L2.FL6EDC02BL2B-L1B-L4A-L2GL103G
L6FEDC02L2BL1BL4B-L2AL4BL603CDEF
EL2GL4GL2GL1CL4DDDL1..C":RETURN
```

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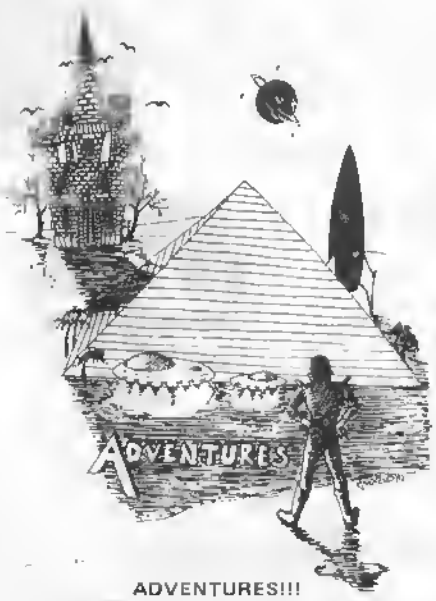

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Hardware Review...

Cord Will Solve Your Plug-Up Problems

Ladies and Gentlemen, the hassle of the century, as far as the 80C is concerned, is—for all practical purposes—ended.

One of the things which aggrivates more people than just about anything we know is the lack of an extra RS-232 port for plugging in, say, a printer and a modem into the computer at the same time. What many people want to do, obviously, is to access information off a bulletin board or data base, and then print out the results on the buffer.

To do that, you have to plug the modem into the serial port on the back of the 80C, read whatever information you wish into the buffer, unplug the modem, plug in the printer, print out what you want and, then assuming that you want to get some more information, unplug the printer, re-plug the modem, and repeat the whole thing again.

You don't have to go through all of that any more. Now, with a single cord available from Spectrum Projects, you are able to plug *that* cord into the RS-232 and plug both the printer and the modem into the other ends of the cord. Works like a charm.

We must confess we have stayed away from the bulletin boards on occasion, simply because we did not want to go through all the plugging and re-plugging time after time. This really does make things a lot easier. And it saves wear and tear on the plugs and sockets.

The cord is well put together and does the job as advertised.

(Spectrum Projects, 93-15 86 Drive, Woodhaven NY 11421, $20)

Book Review...

"The BASIC Handbook" Can Be A Boon For Conversions

David Lein is one of the major authors of computer books and his *BASIC Handbook* first edition is one of the most widely read computer books around. Now, with a second edition of *The BASIC Handbook*, he offers readers an opportunity to make conversions from one form of BASIC to another easily and quickly.

We are pleased to be able to report there is a special section on the Color Computer in this new edition. But, frankly, that is not where the major utility of the book lies. We assume you are familiar with *Color Basic* and with *Extended Color Basic* and, therefore, want to know how to convert, say, a Model III program for use with the 80C.

Now, don't expect to be able to purchase this one book and be able to instantly convert any program for any computer for use to your 80C. That is just not possible many times, and it would take a lot of work to do a conversion when a program has a great deal of POKEs and the like. That is simply because the memory addresses of most computers are different.

The case is true, too, with graphics, by and large. With different screen sizes, different resolutions, different pixel dimensions, some graphics programs are a real bear to convert. And there is no book that can do it for you. Fortunately, the 80C has superior graphics to other computers, anyway.

With those warnings, we must say that Lein's book is an excellent guide through the maze of BASICs which different computer systems use. Say you are trying to convert an Apple program and come across a command named POP. What is that, anyway? Lein explains, and his explaination should give you some ideas on how you might use the 80C's BASIC to program in what the Apple program is doing.

The BASIC Handbook is almost 500 pages long and contains a wealth of information. Each description of a command or function is accompanied by a description of that function, a test program, a sample run and a suggestion on what to do if your computer does not have such a function. It also details variations in usage and cross-references to other commands which have a bearing on the one in question.

Lein makes it simple. There are few technical terms here. The writing style is clear, easy to understand and spiced with a little humor now and then. It is an enjoyable book to read and a valuable reference tool.

(Compusoft Publishing, 1050-E Pioneer Way, Dept. B2, El Cajon, CA 92020, $19.95, plus $1.65 postage and handling. Foreign orders higher.)

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Software Review...

Stock Analyzer Gives A Good Picture Of Holdings

For those of you with stock market holdings, *Stock Analyzer* will allow you to keep track of just how you are doing and what the trends of your particular portfolio are.

The program is tape-based, so it can be a little slow loading and dumping data to files. But, with that exception, it is a good program if you have the time and the interest to chart your capitalistic course.

You must, of course, input all the information on your stocks. For the best results, this can be done on a daily basis, but there is no reason why you cannot decide to input information as of the Friday close each week. That way, you get a weekly — rather than daily — picture. But that is probably more accurate anyway. And, since the program is limited to 300 data sets, (the name, date and price is one data set) its probably more practical to do it this way, anyhow.

You have a number of options in the program, including listing of all holdings by name and the dates and prices of a given stock. These options can be displayed with or without a sort. Of course, there is also input, update and output — so you can keep track of things and save it to tape whenever you wish.

You can also get an analysis of a particular stock, which gives its high, low and average price. The maximum change — from the lowest to the highest — is also given.

The feature of *Stock Analyzer* we like best, however, is the program's ability to graph a stock. If a picture *is* worth a thousand words, then this feature gives you a clear look at your stocks and how they are doing. Because it uses the graphic screen, Extended Color Basic is required for the program.

It also comes with an additional program which can be used to analyze trends. This requires manual input, but can project stock prices into the future. Of course, there is no guarantee in "the market," but this will help see where a stock might be headed if it keeps going the way it has for the past several periods of time you wish to chart.

Stock Analyzer is easy to use after a short familiarization period to its particular syntax. We enjoyed the graphing features and were pleased to see how well the trend program worked. With a lot of data, the tape data storage is slow, but if you have a disk, it is easy to make the conversion. If you follow the market, this is a useful program to have. Of course, you need not use it merely for stocks, as it could just as well be adapted (with some modifications) to chart sales and the like — particularly with the trend feature.

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Software Review...

Mystery Maze A Good Version Of This Game

There are a number of maze games out on the market now, but *MYSTERY MAZE* is as good a rendition of this sort of thing as any of the others and involves a few added extras which can enhance the game quite a bit.

In case you have never seen a 3D maze game, the maze is shown from eye-level (which means you can't see over the top) and you have to wander around in corridors looking for the way out. In those respects, *MYSTERY MAZE* is like all the other ones.

But, it has electrified walls which can be a big problem for those of you (me) who keep bumping into them. And, it also features a map of the maze (from the top) that *will* tell you where you are. Avoids frustration, you know. But, you lose points each time you look at the map, so the whole thing could be self-defeating. Its up to you to decide.

Finally, the place you start in the maze is selected at random each time you play the game. So, you can't memorize the way out after a few times.

MYSTERY MAZE is in 16K Extended Basic, so there are good graphics. It is not as fast as a machine language game would be, but, frankly, in a maze you need a bit of time to think, anyway. Avoids claustrophobia, you know.

(JARB Software, 1169 Florida Street, Imperial Beach, CA 92032, $14.95)

Submitting Material To the Rainbow

Contributions to *the RAINBOW* are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other 80C owners.

Program submissions must be on tape or disk. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary, explaining how the submission works. We're much more interested in how the program works and runs than in how you developed it. Programs should be learning experiences.

We do pay for substantive submissions, based on a number of criteria. Those wishing renumeration should *so state* when making submissions.

Please do not submit programs or articles currently submitted to another publication.

Look For The. . . . .

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Most back issues are available on white paper in a reprint form. All back issues now available would be $26, plus $3.50 postage and handling—a total of $29.50. VISA and MasterCard accepted. Kentucky residents please add 5 percent sales tax.

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Second of a Series...

The NFL Report Can Choose This Fall's Winners

32K ECB

By John Waclo

Put down that Fourth of July firecracker. Did you know the National Football League pre-season action starts next month? There is still time to get your 80C into the NFL if you start following this series.

Last month in Part I, we talked about some overall League statistics that were gathered while watching the 1981 season. We also left you with our program that would generate a week-by-week schedule for the 1982 NFL season.

This month it is time to get down to real business and talk about the *NFL REPORT* program. If you get your enjoyment from watching the NFL games and trying to guess the winners, this is the program for you. It will make every NFL game a little more entertaining this year.

By now you know that in order to have a good chance of guessing the winners, you must have good data on the individual teams. With the *NFL REPORT* program, on your 80C, you will get 32 pages of summarized team data, updated each week of the season. This program will even keep track of team performance against the "spread" or "line."

For those of you who don't remember all the details from last month, the "spread" or "line" is a small number of points given to one team before the game starts to "even up" the two teams. Since the *NFL REPORT* is the heart of this series, we will be devoting all of Part II to explaining the software listing that follows.

Specifically, what information is in the NFL REPORT?

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DISK EDITOR/ASSEMBLER - This package includes a full featured disk based text editor program and a disk to disk/tape/memory assembler. The text editor is an easy to learn full featured editor which allows files larger than memory to be created and edited with ease. It is compatible with ASCII formatted tape & disk files to allow easy conversion of tape based programs. The assembler supports the full 6809 processor instruction set and will create assemble 6809 code to 6809 object code. The output object file can be directed to either disk, tape or memory with overwrite protection. The object listing can be output to the screen or printer and versions for printers with or without line feeds are provided. DISK EDITOR & ASSEMBLER $79.95

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Let's take a closer look at what you get in the report. The first item generated by the program is called the NFL ranking. In this listing, all 28 teams are ranked according to their won-loss-tie record. Yes, the program will properly rank ties. Other items in the list include total points scored in the NFL to that week of the season, the average points per team per game, the average point difference per game and the current home team winning percentage.

The next listing in this report is the "spread" ranking. This list ranks the 28 NFL teams according to their W-L-T records, but this time the 80C takes into account the final score including the point spread. You would be amazed at how the won-loss records change when you include the spread. For example, last year Dallas has a 12-4 record without the spread, and that changed to a 9-7 record with the spread figured in. Now, that is good information to have, but you won't get it from Bryant Gumbel or Phyllis George. This listing also includes the home team winning percentage—including the spread.

Another important listing is the Power Factor Ranking. This ranks all teams according to their power factor (calculated by the model) from the most to the least powerful. In one quick listing, you get the complete picture of how the power is distributed across the various NFL teams. It is very interesting to watch this listing change from week to week. You'll be hanging over your printer, waiting for this information to come out.

The most important single item in the *REPORT* is the Team Summary information. Each week of the season, this program will generate individual team data for each of the league's 28 teams. In last month's issue of *the RAINBOW*, I included the team summary for the San Francisco 49'ers. I did this because they are the World Champions and Super Bowl winners. For that reason, I thought most readers would find it interesting to see what this team's data looked like. This month, I have decided to illustrate a team summary by using the data for the Minnesota Vikings. I selected this team because their data has a great deal of variation.

How do I read a Team Report?

We will answer that question by looking at a team summary and discussing each item from the top.

Notice in the upper left hand corner that it says "after week 16." This means that the data presented is current through the 16th week of the season. Since the *REPORT* is updated weekly, it might be possible to get old sheets mixed up with new ones. Therefore, each page is numbered with the week it represents. Also, since there are 16 weeks in the regular NFL season, this means the data shown represents all data for last year's play.

Under the team name, we can see the division ranking for that week—fourth. If they were tied for fourth, it would have said "4T." In any case, Minnesota finished next to last in the NFC Central (sometimes called the Black and Blue Division) last year.

Continuing down the page, we see the Vikes were tied for 17th place (17 T) when comparing their Won-Lost record with all other teams in the league. We also note they did a

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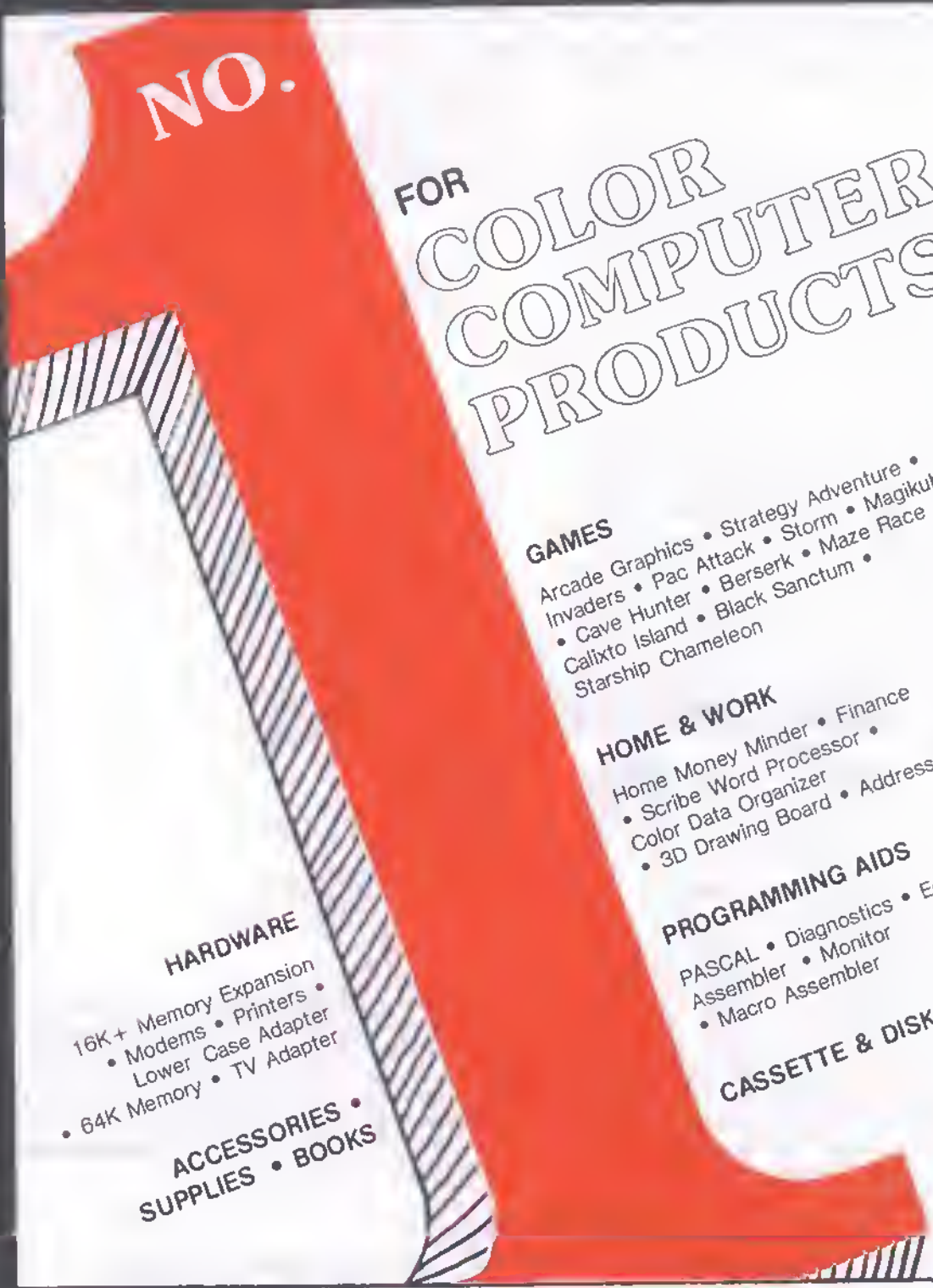

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NFL—From Page 50

little better (tied for 11th) when you include the spread.

Perhaps these facts are pointed up in a more interesting way when you see the Vikings had a W-L-T record of 7-9-0 on pure scores and then went to 8-7-1 with the spread. That is a middle of the road performance. They did about the same at home, with and without the line being taken into consideration.

The "Games Played" section might need some explaination since there is a lot going on in this portion of the summary. The first line, moving from left to right, indicates which regular season games were won, lost or tied. The second line indicates the same information—when you use the spread for that particular game. The last line in this section shows what the actual spread was for each game that was played. For example, 2U means Minnesota was a two-point underdog. A 3F means they were favored by three points. The "0E" stands for a zero-even game—no points were given to either team.

The "Last 3 Games" section is a sort of moving window which indicates what the offense and defense have done for the last three games. You also get the Average Score Difference in points per game. A negative number here shows the team is losing by that number of points per game.

The "Total Season" section gives you the season-to-date average of all offensive points scored and all points allowed by the defense. This section also calculates the Average Score Difference per game for the entire season

The next team summary item is important: The Team Power Factor! This number is a relative indicator of overall team power. It changes every week. The higher the number, the stronger the team. If the number is negative, the team is probably losing more than winning. The Power Factor takes into account each team's total wins, total points scored and total points allowed.

The final section of the team summary gives a rundown of the games which each team has played so far. This listing tells you the opposing team's name, the game outcome (W-L-T), the field of play (H or A) and the final score. This is good information to have as the season progresses.

What should I look for in the Team Summary?

All the data in the team summary has been presented so you can do quick comparisons. That is the key.

First, compare NFL Ranking and Spread Ranking. If the Spread Ranking is higher, the "line" is helping this team win games. If the Spread Ranking is lower, this team is not doing well as a favorite. You can even compare a team's ranking with the team that it will be playing next week.

Another comparison that can be significant is to look at the total games won and the total games won at home. Look at our example. Minnesota won seven games last season and the comparison shows you that five of those wins came at home. That says the Vikings did not do well on the road last year. But watch that because the same comparison will also tell you that they were 50-50 when you include the spread.

There are some interesting comparisons in the Games Played section. Take a closer look at games five, nine and twelve. Notice that in game five, Minnesota was a three-point favorite, won the game, but was tied when you consider the spread. In both games nine and twelve, they were four-point underdogs, lost the game, but lost by less than four points—so they won with the spread. You can also find the names of the opposing teams by looking at lines five, nine and twelve of the schedule at the bottom of the summary.

after week 16

MINNESOTA VIKINGS
NFC CENTRAL # 4

NFL Ranking: 17 1
SPREAD Ranking: 11 T

	WON	LOST	TIED	
Record:	7	9	0	
	8	7	1	with spread
At Home:	5	3	0	
	4	3	1	with spread

Games played:

L	L	W	W	W	W	W	L	L	W	W	L	L	L	L	L
L	L	W	W	T	W	W	L	W	W	W	W	L	L	L	L
2U	3U	0E	3U	3F	7U	4U	2F	4U	4F	9F	4U	7F	4F	4U	2F

spr

Last 3 games:

Offense is scoring 7 points/game
Defense is giving up 22 points/game
Average score difference is -14 points/game

Total Season:

Offense is scoring 20 points/game
Defense is giving up 23 points/game
Average score difference is -3 points/game

TEAM POWER FACTOR IS: +4

WON	LOST	TIED	SCORE
	TAMPA BAY BUCCANEERS		A 13-21
	OAKLAND RAIDERS		H 10-36
DETROIT LIONS			H 26-24
GREEN BAY PACKERS			A 30-13
CHICAGO BEARS			H 24-21
SAN DIEGO CHARGERS			A 33-31
PHILADELPHIA EAGLES			H 35-23
	ST. LOUIS CARDINALS		A 17-30
	DENVER BRONCOS		A 17-19
TAMPA BAY BUCCANEERS			H 25-10
NEW ORLEANS SAINTS			H 20-10
	AILANTA FALCONS		A 30-31
	GREEN BAY PACKERS		H 23-35
	CHICAGO BEARS		A 9-10
	DETROIT LIONS		A 7-45
	KANSAS CITY CHIEFS		H 6-10

Even more interesting comparisons can be made between the "Last Three Games" and "Total Games" sections. Look at our example again and compare Minnesota's "Total Season" offensive scoring with the "Last Three Games" scoring. See what I mean? Their offense could not put points on the board for the last three games. They averaged 20 points per game for the year, but only seven points per game for the last three games.

See NFL—Page 54

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The screen-oriented text editor is designed for efficient and easy editing of assembly language programs. The "Help Key" feature makes it simple and fun to learn to use the editor. As the editor requires no line numbers, you can use the arrow keys to position the cursor anywhere in the file. MACRO-80C allows global changes and moving/copying blocks of text. You can edit lines of assembly source which are longer than 32 characters.

DCBUG is a machine language monitor which allows examining and altering of memory, setting break points, etc.

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The powerful screen-oriented Editor features finds, changes, moves, copys and much more. All keys have convenient auto repeat (typamatic), and since no line numbers are required, the full width of the screen may be used to generate well commented code.

The Assembler features all of the following: complete 6809 instruction set, conditional assembly, local labels, assembly to cassette tape or to memory, listing to screen or printer, and mnemonic error codes instead of numbers.

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NFL—From Page 52

On the other hand, their defense seemed to hold (well, it *is* the Black and Blue division) its own all year. They gave up 23 points per game all year and 22 in the last three.

Comparisons play a very significant role when you consider the Team Power Factor. As we said before, this number is an attempt to place a numerical value on team strength. Use it when comparing two teams to predict the outcome of a game.

When comparing teams, you cannot say that one with a Team Power Factor of 12 will beat another with a Team Power Factor of 9. The game of football is not played with that much, repeatable, precision. However, a team with a Power Factor of 18 will, more certainly, beat a team with a Power Factor of -9. The key is to look for opposing teams which produce large Power Factor differences.

Before I go on and talk about the program that generates all this information, it occurred to me that not every reader has an 80C with 32K and a printer (which this program requires). If you are interested in this information and would like a complete copy of the *NFL REPORT* from Week 16 of last year's NFL season, send me $5.95 and I'll send you one post-paid. My address is on the program listing.

If you have an 80C with 32K and a printer, you will be able to generate your own *NFL REPORT*. You can do this because I have included *all* the data from the 1981 season in the program listing which appears below. That's right: All the games, all the scores, spreads and spread winners. It is a ton of data (as you will see from the DATA statements).

If you load the listed program, it will produce the *NFL REPORT* for any week of the season that you choose. If you wish, you can actually replay the 1981 NFL season one week at a time.

This program is configured for an MX-80 printer. However, it can be modified for most popular printers. Also, don't forget to change Line 55 for your baud rate. You must have 32K and extended basic to run this program.

When you RUN the program it will ask "Which Week's" Report you desire. Enter your week of interest and the program will ask you to press ENTER when the printer is ready. After that, it will prepare the *REPORT's* title page and then there will be a delay while it calculates all the numbers in the *REPORT*. This delay can be substantial (about 90 seconds for a Week 16 *REPORT*). There is just a lot of data.

In next month's issue of *the RAINBOW*, our concluding article will show you how to collect data during this year's season (using your schedules from Part I) and how to enter data into the program. We will also discuss what we found as a result of closely watching each team's performance last year.

See whether you agree with our predictions and trends in Part III.

The Listing:

```
1 '  ** NFL REPORT **
2 '  REV  3/27/82  (C) 1982
3 '  JOHN WACLO
4 '  BOX 11224
5 '  PITTSBURGH, PA  15238
10 GOTO2100
15 CLS3:PRINT"       ***NFL FOOT
BALL***"
30 PRINTSTRING$(32,"=");:PRINT
35 FOR I=0TO7:READ E$:NEXT
40 INPUT"HOW MANY WEEKS ARE COMP
LETED";W
```

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51 x 24 DISPLAY

The Color Computer is an incredibly powerful and versatile computer, but for text editing it has some major drawbacks. The small 32 character by 16 line screen format shows you too little of the text and, combined with its lack of lower case letters, bears little resemblance to the way text really looks on the page. Reverse video in place of lower case just adds confusion.

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. . . one of the best programs for the Color Computer I have seen . . .
— Color Computer News, Jan. 1982

You can copy, move or delete any size block of text, search repeatedly for any pattern of characters, then instantly delete it or replace it with another. Telewriter gives you a tab key, tells you how much space you have left in memory, and warns you when the buffer is full.

FORMAT FEATURES

When it comes time to print out the finished manuscript, Telewriter lets you specify: left, right, top, and bottom margins; line spacing and lines per page. These parameters can be set before printing or they can be dynamically modified during printing with simple format codes in the text.

. . . truly a state of the art word processor . . . outstanding in every respect.
— The RAINBOW, Jan. 1982

Telewriter will automatically number pages (if you want) and automatically center lines. It can chain print any number of text files from cassette or disk without user intervention. You can tell it to start a new page anywhere in the text, pause at the bottom of the page, and set the Baud rate to any value (so you can run your printer at top speed).

You can print all or any part of the text buffer, abort the printing at any point, and there is a "Typewriter" feature which allows you to type straight to your printer. Because Telewriter lets you output numeric control codes directly (either from the menu or during printing), it works with **any** printer. There's even a special driver for the Epson MX-80 that lets you simply select any of its 12 fonts and do underlining with a single underline character.

CASSETTE AND DISK I/O

Because Telewriter makes using cassette almost painless, you can still have a powerful word processor without the major additional cost of a disk. The advanced cassette handler will search in the forward direction till it finds the first valid file, so there's no need to keep retyping a load command when you are lost in your tape. The Verify command checks your cassette saves to make sure they're good. You can save all or any part of the text buffer to disk or cassette and you can append pre-existing files from either medium to what you have in the buffer already.

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Or call (714) 755-1258 weekdays 7 AM-4PM PST. We will gladly answer your questions.

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```
45 R2$=CHR$(10):DIMT$(28),F$(16,
28),TS(16,28),OS(16,28),S$(16,28
),TW(28),TL(28),TT(28),SW(28),SL
(28),ST(28),HW(28),HL(28),NT(28)
,W1(28),L1(28),T1(28),T(28),RX(2
8),SX(28),NO(16,28),PF(28)
50 PRINT:PRINT"WHEN PRINTER IS R
EADY...":INPUT"PRESS <ENTER>";H:
PRINT:PRINT"PROCESSING..."
55 POKE150,18:POKE155,80
60 T$(1)="PITTSBURGH STEELERS"
65 T$(2)="CLEVELAND BROWNS"
70 T$(3)="HOUSTON OILERS"
75 T$(4)="CINCINNATI BENGALS"
80 T$(5)="BUFFALO BILLS"
85 T$(6)="MIAMI DOLPHINS"
90 T$(7)="NEW ENGLAND PATRIOTS"
95 T$(8)="NEW YORK JETS"
100 T$(9)="BALTIMORE COLTS"
105 T$(10)="SAN DIEGO CHARGERS"
110 T$(11)="OAKLAND RAIDERS"
115 T$(12)="KANSAS CITY CHIEFS"
120 T$(13)="DENVER BRONCOS"
125 T$(14)="SEATTLE SEAHAWKS"
130 T$(15)="DALLAS COWBOYS"
135 T$(16)="PHILADELPHIA EAGLES"
140 T$(17)="WASHINGTON REDSKINS"
145 T$(18)="ST. LOUIS CARDINALS"
150 T$(19)="NEW YORK GIANTS"
155 T$(20)="MINNESOTA VIKINGS"
160 T$(21)="DETROIT LIONS"
165 T$(22)="TAMPA BAY BUCCANEERS
"
170 T$(23)="CHICAGO BEARS"
175 T$(24)="GREEN BAY PACKERS"
180 T$(25)="ATLANTA FALCONS"
185 T$(26)="LOS ANGELES RAMS"
190 T$(27)="SAN FRANCISCO 49ERS"
195 T$(28)="NEW ORLEANS SAINTS"
200 PRINT#-2,STRING$(28,10):PRIN
T#-2,TAB(27)CHR$(14)"The NFL Rep
ort";R2$:PRINT#-2,TAB(34)CHR$(14
)"Week ";W;CHR$(12)
205 TIMER=0:IF W=0THEN 665
210 FORX=1TO W
215 FORY=1TO28
220 READ T(Y),F$(X,Y),TS(X,Y),OS
(X,Y),S$(X,Y),NO(X,Y)
225 IF T(Y)<>Y THEN PRINT"DATA E
RROR T(Y)<>Y AT WEEK"X"AND TEAM"
Y:END
230 IF T(Y)=NO(X,Y)THENPRINT"TEA
M"Y"PLAYED ITSELF IN WEEK"X:END
235 ST=TS(X,Y)+ST:SO=OS(X,Y)+SO:
NO=NO(X,Y)+NO
240 IF F$(X,Y)="N"THEN HG=HG+1 E
LSE AG=AG+1
245 ON SGN(TS(X,Y)-OS(X,Y))+2 GO
TO 250,265,280
250 TL(Y)=TL(Y)+1
255 IF F$(X,Y)="N"THEN HL(Y)=HL(
Y)+1
260 GOTO290
265 TT(Y)=TT(Y)+1
270 IF F$(X,Y)="H"THEN HT(Y)=HT(
Y)+1
275 GOTO290
280 TW(Y)=TW(Y)+1:DS=DS+(TS(X,Y)
-OS(X,Y))
285 IF F$(X,Y)="H"THEN HW(Y)=HW(
Y)+1
290 IF LEFT$(S$(X,Y),1)="W"THEN
SW(Y)=SW(Y)+1:IF F$(X,Y)="H"THEN
 W1(Y)=W1(Y)+1
295 IF LEFT$(S$(X,Y),1)="L"THEN
SL(Y)=SL(Y)+1:IF F$(X,Y)="H"THEN
 L1(Y)=L1(Y)+1
300 IF LEFT$(S$(X,Y),1)="T"THEN
ST(Y)=ST(Y)+1:IF F$(X,Y)="H"THEN
 T1(Y)=T1(Y)+1
305 NEXT Y
310 IF NO<>406*X THENPRINT"DATA
ERROR NO<>406 IN WEEK"X:END
315 IF ST<>SO THEN PRINT"DATA ER
ROR ST<>SO IN WEEK"X:END
320 IF HG<>AG THEN PRINT"DATA ER
ROR HG<>AG IN WEEK"X:END
325 NEXT X
330 FOR X=1TO28:TH=HW(X)+TH:SH=W
1(X)+SH:NEXT
335 PRINT"ALL DATA IN ";:PRINTUS
```

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Own a TRS-80 Color Computer? Wish you had Lower Case?

For $75.00 and five minutes of your time you can have full upper and true lowercase (not just reverse video) with the LCA-47 lowercase adapter from Micro Technical Products.

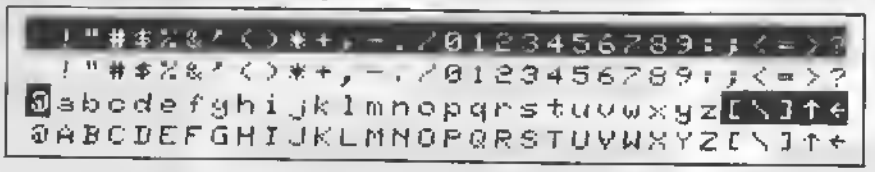
What is it? The LCA-47 is a small PC board (1.9 × 3.6 in.) that plugs into your computer's main PC board: leaves the expansion connector free. It doesn't take up any system memory: uses a fast Bipolar Character Generator for guaranteed operation.

Installation is quick and simple: no cutting or soldering required.

Fully assembled, tested, and guaranteed for 1 full year.

Two switches provided on board: one to enable or disable the lowercase. The other to invert the entire screen (light characters on a dark background).

What does it provide? The 128 characters below: improved upper case and very readable lowercase with descending tails, all available to both Basic and machine language programs.



RAINBOW CERTIFICATION SEAL

Custom character sets are available as an option, call for a quote.

Compatibility: The LCA-47 is fully compatible with all TRS-80C software that we know of, including Color Scripsit. It has no effect on any semi-graphics or full-graphics modes. Also works great with Micro-Chroma-68 Kits and others using the 6847 VDG chip! The LCA-47 will not fit under the RF shield if Computerware's "16-plus" memory board is installed.

How to order: Send $75.00 plus $5.00 shipping in the U.S., $10.00 elsewhere, to:

Micro Technical Products, Inc.

814 W. Keating Ave., Dept. A
Mesa, AZ 85202

Arizona residents add $3.75 sales tax.

Phone: 602-839-8902
MC and VISA welcome.

COLOR COMPUTER USERS

THE POWERFUL FLEX DISK OPERATING SYSTEM WITH HUNDREDS OF SOFTWARE PACKAGES IS NOW AVAILABLE!

Now you can run FLEX, OS-9 and Radio Shack disk software on your Color Computer. If you have a 32K Color Computer with the Radio Shack disk system, all you need to do is make a trivial modification to access the hidden 32K, as described in the Feb issue of COLOR COMPUTER NEWS and the April issue of '68' Micro. You can get FLEX from us right now. OS-9 will be ready by summer. Please note that this will only work with the Radio Shack disk system and 32K/64K memory chips that RS sells 32K. Maybe they put 64K's in yours, too. If you don't have a copy of the article, send a legal size SASE (40¢ stamps) and we'll send it to you.

Using this system to run FLEX and OS-9 has many advantages. First, it gives you 48K from zero right up to FLEX. This means that *ALL* FLEX compatible software will run with *NO MODIFICATIONS* and *NO PATCHES!* There are no memory conflicts because we moved the screen up above FLEX which leaves the lowest 48K free for user programs.

What you end up with is 48K for user programs, 8K for FLEX and another 8K above FLEX for the screens and stuff. We have a multi screen format so you can page backward to see what scrolled by and a Hi-Res screen that will enable us to have 24 lines by 42 character display is on the way. That's better than an Apple!

We also implemented a full function keyboard, with a control key and escape key. All ASCII codes can now be generated from the Color Computer keyboard!

We also added some bells and whistles to Radio Shack's Disk system when you're running FLEX or OS-9. We are supporting single or double sided, single or double density, 35, 40 and 80 track drives. If you use double sided drives, the maximum is three drives because we use the drive 3 select for side select. When you are running the Radio Shack disk, it will work with the double sided drives but it will only use one side and only 35 tracks. Using 80 track drives is okay, but will not be compatible with standard Radio Shack software. You can also set each drive a stepping rate and drive type. (SS or DS - SD or DD)

In case you don't understand how this works, I'll give you a brief explanation. The Color Computer was designed so that the roms in the system could be turned off under software control. In a normal Color Computer this would only make it go away. However, if you put a program in memory to do something first (like boot in FLEX or OS-9), when you turn off the roms, you will have a full *64K RAM* System with which to run your program.

Now, we need the other half of the 64K ram chips to work, and this seems to be the case most of the time, as the article states. Of course, you could also put 64K chips in.

Some neat utilities are included.

MOVEROM moves Color Basic from ROM to RAM. Because it's moved to RAM you can not only access it from FLEX, you can run it and even change it!! You can load Color Computer cassette software and save it to FLEX disk. Single Drive Copy, Format and Setup commands plus an online help system are included.

Installing FLEX is simple. Insert the disk and type:

RUN "FLEX"

That's all there is to it! You are now up and running in the most popular disk operating system for the 6809. There are hundreds of software packages now running under the FLEX system. Open your Color Computer to a whole new world of software with FLEX.

FLEX $99.00
INCLUDES OVER 25 UTILITIES!

Other languages available include; FORTH, Pascal, Fortran77, 'C,' A/BASIC compiler, plus more.
Application packages include; A/R, G/L, A/P, Inventory, Electronic Spreadsheets, Accounting, Database programs and more. SEND FOR LIST.

TRS-80 COLOR COMPUTER COMPLETE WITH 64K RAM, 24K ROM, SINGLE DISK DRIVE AND FLEX, SET UP AND READY TO RUN FOR ONLY $1,275. Includes 60 day extended warranty. If you have a Computer, call about RS disk controllers and drives.

SOFTWARE CATALOG

PROGRAM	OBJECT/WITH DUET/SOURCE		code
BILLPAYER		159.95	x
PLOT		44.95	x
TABULA RASA		100.00	x
Mailing List		99.95	x
Forms Display		49.95	s
Inventory with Material Requisition Planning		100.00	s
Some Common BASIC Programs		99.95	s
FLEX For Color Computer	99.00		9
X-FORTH (FLEX)	149.95		8 & 9
CC-FORTH (TRS-80 Color)	99.95		9
TOOLKIT #1 (BASIC)	49.95	69.95	9
TOOLKIT #2	49.95	69.95	8
AUTOTASK		129.95	9
A/BASIC Compiler	150.00		8
Extended Utilities	49.95	69.95	9
Password Protection	69.95	99.95	9
CRASMB (X Assembler)	139.95		9
Personality Modules (1 IHC) 6502, 6800, 6809, Z80, 8080, 1802	25.00	50.00	9 ea
READTAPE		64.95	9
SPELLTEST	199.00	299.00	9
READTEST	54.95	74.95	8 & 9
ESTHER	39.95	50.95	8 & 9
HELP	29.95	49.95	8 & 9
Job Control Program	49.95	89.95	8 & 9
DYNASOFT PASCAL (FLEX)	50.95	89.95	9
DYNASFT PASCAL (OS-9)	99.95	99.95	8
DYNASOFT Compiler Source		125.00	P
DYNASTAR Screen Editor (OS-9)	149.95		9
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SUPER SLEUTH (Z80)		99.00	8 & 9
CROSS Assembler Macros for TSC ASMB 6800/1, 6500, 6502, Z80, 8080/5	3 FOR	49.95 99.95	each
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STYLOGRAPH Spelling Checker	145.00		9

CODE X = XBASIC, 9 = 6809, 8 = 6800, P = PASCAL

Software by Technical Systems Consultants, Inc.

FlexTM (includes Editor & Assembler)	150.00
UniFLEXTM (includes one year maintenance and update)	450.00
Editor	50.00
Assembler	50.00
68000 Cross Assembler on 6809	250.00
Text Processor	75.00
Extended Basic	100.00
Basic Precompiler (specify standard or extended)	50.00
Pascal (FlexTM)	200.00
Pascal (UniFLEXTM) (Add $75.00 for one year's maintenance and update)	225.00
Sort/Merge Package	75.00
6809 FlexTM Utilities	75.00
Debug Package	75.00
Diagnostic Package	75.00
Software by Microware Systems Corp.	
OS-9 TM Level One Operating System	200.00
OS-9TM Level Two Operating System	500.00
BASIC09TM	200.00
OS-9TM Macro Text Editor	125.00
OS-9TM Interactive Assembler	125.00
OS-9TM Interactive Debugger (Disk version)	50.00
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Pascal Compiler	400.00

USA add $2.50 for standard UPS shipping & handling
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IDS	460G	852.50	876.00
IDS	560G	1094.50	1124.50
Centronics	Y38	519.00	533.50
Centronics	Y39-3	641.50	658.79
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Disk(s) have the source of everything but the core.
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NFL—From Page 56

```
TNG "###";TIMER/60;:PRINT" SECON
DS"
340 PRINT#-2,R2$
345 PRINT#-2,TAB(65)"after week"
;W;R2$
350 PRINT#-2,TAB(10)CHR$(14)"NFL
 Ranking";R2$
355 PRINT#-2,TAB(21)"TEAM";TAB(4
0)"WON";TAB(50)"LOST";TAB(60)"TI
ED";R2$
360 Z=1:GOSUB700:Z=0
365 PRINT#-2,R2$:PRINT#-2,TAB(10
)"Total points scored this seaso
n:";:PRINT#-2,USING"##,###";ST
370 PRINT#-2,TAB(10)"Average poi
nts/team/game is: ";:PRINT#-2,US
ING "##";ST/(W*28)
375 PRINT#-2,TAB(10)"Average Poi
nt-Difference/game is: ";:PRINT#
-2,USING "##.#";DS/(14*W)
380 PRINT#-2,TAB(10);"Home team
winning percentage is: ";:PRINT#
-2,USING "##";(TH/((14*W))*100;:P
RINT#-2,"%";CHR$(12)
385 PRINT#-2,R2$:PRINT#-2,TAB(65
)"after week";W;R2$
390 PRINT#-2,TAB(10)CHR$(14)"SPR
EAD Ranking";R2$
395 PRINT#-2,TAB(21)"TEAM";TAB(4
0)"WON";TAB(50)"LOST";TAB(60)"TI
ED";R2$
400 GOSUB700
405 PRINT#-2,R2$:PRINT#-2,TAB(10
)"Home team winning percentage i
s: ";:PRINT#-2,USING "##";(SH/(1
4*W))*100;:PRINT#-2,"%";CHR$(12)
410 FOR Y=1TO28
415 PRINT#-2,R2$;TAB(65)"after w
eek"W;R2$
420 PRINT#-2,TAB(10)CHR$(14);T$(
Y)
425 IF Y<5THENPRINT#-2,TAB(10)"A
FC CENTRAL   #";:Q1=1:Q2=4:GOTO4
55
430 IF Y<10THENPRINT#-2,TAB(10)"
AFC EAST   #";:Q1=5:Q2=9:GOTO455
435 IF Y<15THENPRINT#-2,TAB(10)"
AFC WEST   #";:Q1=10:Q2=14:GOTO4
55
440 IF Y<20THENPRINT#-2,TAB(10)"
NFC EAST   #";:Q1=15:Q2=19:GOTO4
55
445 IF Y<25THENPRINT#-2,TAB(10)"
NFC CENTRAL   #";:Q1=20:Q2=24:GO
TO455
450 PRINT#-2,TAB(10)"NFC WEST
#";:Q1=25:Q2=28
455 P$="":P=1:FOR Q=Q1 TO Q2
460 IF Q=Y THEN475
465 IF TW(Q)>TW(Y)THEN P=P+1
470 IF TW(Q)=TW(Y)THEN P$="T"
475 NEXT Q:PRINT#-2,P;P$;R2$
480 P1$="":P2$="":FOR Q=1TO28
485 IF Q=Y THEN500
490 IF TL(Q)=TL(Y)AND TT(Q)=TT(Y
) THEN P1$="T"
495 IF SL(Q)=SL(Y)AND ST(Q)=ST(Y
) THEN P2$="T"
500 NEXT Q:PRINT#-2,TAB(10)"NFL
Ranking:";RX(Y);P1$
505 PRINT#-2,TAB(10)"SPREAD Rank
ing:";SX(Y);P2$;R2$
510 PRINT#-2,TAB(20)"WON";TAB(35
)"LOST";TAB(50)"TIED";R2$
515 PRINT#-2,TAB(10)"Record:";TA
B(20)TW(Y);TAB(35)TL(Y);TAB(50)T
T(Y)
520 PRINT#-2,TAB(20)SW(Y);TAB(35
)SL(Y);TAB(50)ST(Y);TAB(60)"with
 spread";R2$
525 PRINT#-2,TAB(10)"At Home:";T
AB(20)HW(Y);TAB(35)HL(Y);TAB(50)
NT(Y)
530 PRINT#-2,TAB(20)W1(Y);TAB(35
)L1(Y);TAB(50)T1(Y);TAB(60)"with
 spread";R2$
535 PRINT#-2,TAB(10)"Games playe
d:";R2$:PRINT#-2,TAB(9)" ";
540 FOR Q=1TO W
545 IF TS(Q,Y)-OS(Q,Y)>0THEN P$=
"W   ":GOTO560
550 IF TS(Q,Y)-OS(Q,Y)=0 THEN P$
="T   ":GOTO560
555 P$="L   "
560 PRINT#-2,P$;:NEXT Q:PRINT#-2
565 PRINT#-2,TAB(9)" ";
570 FOR Q=1TO W
575 PRINT#-2,LEFT$(S$(Q,Y),1)"
 ";:NEXT:PRINT#-2,"spr"
580 PRINT#-2,TAB(8)" ";:FOR Q=1T
O W:PRINT#-2,MID$(S$(Q,Y)+"   ",
2,4);:NEXT:PRINT#-2,R2$
585 OP=0:GP=0:OT=0:DT=0
590 FOR Q=1TO W
595 OT=OT+TS(Q,Y):DT=DT+OS(Q,Y)
600 IF Q>W-3 THEN OP=OP+OS(Q,Y):
GP=GP+TS(Q,Y)
605 NEXT Q:IF W<4THEN630
610 PRINT#-2,TAB(10)"Last 3 game
s:";R2$
615 PRINT#-2,TAB(10)"Offense is
scoring ";:PRINT#-2,USING "##";G
P/3;:PRINT#-2," points/game"
620 PRINT#-2,TAB(10)"Defense is
giving up ";:PRINT#-2,USING "##"
;OP/3;:PRINT#-2," points/game"
625 PRINT#-2,TAB(10)"Average sco
re difference is ";:PRINT#-2,USI
NG "+##";(GP-OP)/3;:PRINT#-2," p
oints/game";R2$
630 PRINT#-2,TAB(10)"Total Seaso
n:";R2$
635 PRINT#-2,TAB(10)"Offense is
```


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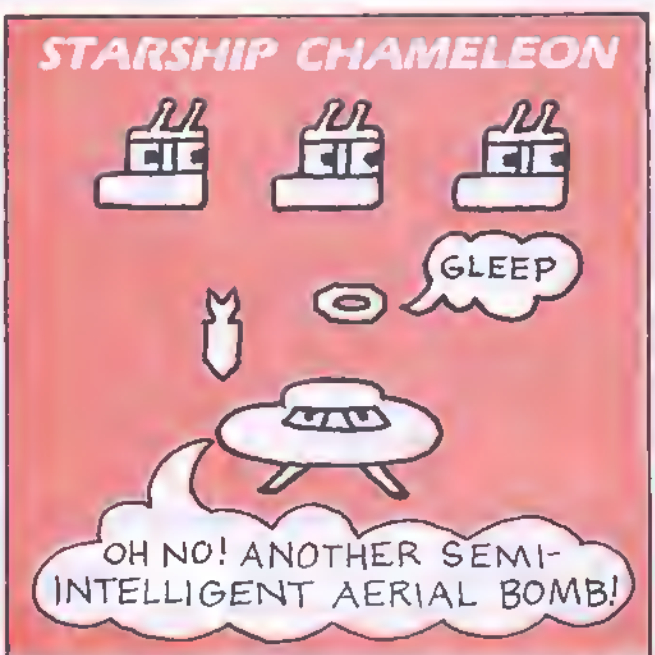
```
scoring ";:PRINT#-2,USING "##";O
T/W;:PRINT#-2," points/game"
640 PRINT#-2,TAB(10)"Defense is
giving up ";:PRINT#-2,USING "##"
;DT/W;:PRINT#-2," points/game"
645 PRINT#-2,TAB(10)"Average sco
re difference is ";:PRINT#-2,US1
NG "+##";(OT-DT)/W;:PRINT#-2," p
oints/game";R2$
650 PF(Y)=((OT-DT)/W)+TW(Y):PRIN
T#-2,TAB(16)CHR$(14)"TEAM POWER
FACTOR IS:";:PRINT#-2,USING "+##
";PF(Y);:PRINT#-2,R2$
655 GOSUB760
660 NEXT Y
665 PRINT#-2,R2$:PRINT#-2,TAB(60
)"Data for week";W+1;R2$
670 PRINT#-2,TAB(38)"FIELD";TAB(
45)"TEAM";TAB(51)"OPPONENT";TAB(
60)"SPREAD   OPNT."
675 PRINT#-2,TAB(21)"TEAM";TAB(3
8)"(H/A)";TAB(45)"SCORE";TAB(52)
"SCORE";TAB(60)"(W/L/T)    #";R2
$
680 FOR Y=1TO28
685 PRINT#-2,1500+INT(.25*Y)+(10
*W);TAB(10);:PRINT#-2,USING "##"
;Y;:PRINT#-2,TAB(14)T$(Y);TAB(36
)",";TAB(43)",";TAB(50)",";TAB(5
9)",";TAB(67)",";R2$
690 NEXT:PRINT#-2,CHR$(12):GOSUB
795
695 PRINT#-2,CHR$(27)"P":LLIST15
00-:END
700 J=1:L=1:FOR X=0TO W:Q=1
705 FOR Y=1TO 28
710 IF Z=1THEN715ELSE720
715 IF X=TL(Y)AND TT(Y)=Q-1THEN7
25ELSE740
720 IF X=SL(Y)AND ST(Y)=Q-1THEN7
25ELSE740
725 PC=PC+1
730 IF Z=1THENPRINT#-2,CHR$(0);T
AB(10);:PRINT#-2,USING "##";J;:P
RINT#-2,TAB(14)T$(Y);TAB(41)TW(Y
);TAB(51)TL(Y);TAB(61)TT(Y):J=J+
1:RX(Y)=L:GOTO740
735 PRINT#-2,CHR$(0);TAB(10);:PR
INT#-2,USING "##";J;:PRINT#-2,TA
B(14)T$(Y);TAB(41)SW(Y);TAB(51)S
L(Y);TAB(61)ST(Y);R1$:J=J+1:SX(Y
)=L
740 NEXT Y
745 IF PC>0THEN PC=0:L=J
750 IF Q<3THEN Q=Q+1:GOTO705
755 NEXT X:RETURN
760 PRINT#-2,TAB(14)"WON";TAB(33
)"LOST";TAB(53)"TIED";TAB(70)"SC
ORE";R2$
765 FOR Q=1TO W:ON SGN(TS(Q,Y)-O
S(Q,Y))+2 GOTO 770,775,780
770 PRINT#-2,TAB(25)T$(NO(Q,Y));
:GOTO785
775 PRINT#-2,TAB(45)T$(NO(Q,Y));
:GOTO785
780 PRINT#-2,TAB(5)T$(NO(Q,Y));
785 PRINT#-2,TAB(68)F$(Q,Y)" ";:
PRINT#-2,USING "##";TS(Q,Y);:PRI
NT#-2,"-";:PRINT#-2,USING "##";O
S(Q,Y)
790 NEXT Q:PRINT#-2,CHR$(12):RET
URN
795 PRINT#-2,STRING$(6,10):PRINT
#-2,TAB(15);CHR$(14)"POWER FACTO
R RANKING";R2$
800 FOR X=30TO-30STEP-1:FOR Y=1T
028
805 IF INT(PF(Y)+.5)=X THEN PRIN
T#-2,CHR$(0);TAB(15)T$(Y);TAB(40
);:PRINT#-2,USING "+##";PF(Y)
810 NEXT Y,X:PRINT#-2,CHR$(12):R
ETURN
830 DATA BD,B3,ED,1F,02,7E,96,A7
1500 DATA 1,H,33,37,L9F,12,2,H,1
4,44,L2F,10,3,A,27,20,W6U,26,4,H
,27,21,W5F,14,5,H,31,0,W5F,8,6,A
,20,7,W0E,18,7,H,28,29,L7F,9
1505 DATA 8,A,0,31,L5U,5,9,A,29,
28,W7U,7,10,A,44,14,W2U,2,11,A,7
,9,L3F,13,12,A,37,33,W9U,1,13,H,
9,7,W3U,11,14,A,21,27,L5U,4
1510 DATA 15,A,26,10,W2F,17,16,A
,24,10,W6F,19,17,H,10,26,L2U,15,
18,H,7,20,L0E,6,19,H,10,24,L6U,1
6,20,A,13,21,L2U,22,21,H,24,17,W
5F,27
1515 DATA 22,H,21,13,W2F,20,23,H
,9,16,L4F,24,24,A,16,9,W4U,23,25
,H,27,0,W9F,28,26,H,20,27,L6F,3,
27,A,17,24,L5U,21,28,A,0,27,L9U,
25
1520 DATA 1,A,10,30,L3U,6,2,H,3,
9,L4F,3,3,A,9,3,W4U,2
1525 DATA 4,A,31,30,W4U,8,5,A,35
,3,W2F,9,6,H,30,10,W3F,1,7,A,3,1
3,L4U,16
1530 DATA 8,H,30,31,L4F,4,9,H,3,
35,L2U,5,10,H,28,23,L7F,21,11,A,
36,10,W3F,20
1535 DATA 12,H,19,10,W4F,22,13,A
,10,13,L0E,14,14,H,13,10,W0E,13,
15,H,30,17,W12F,18
1540 DATA 16,H,13,3,W4F,7,17,H,7
,17,L7F,19,18,A,17,30,L12U,15,19
,A,17,7,W7U,17
1545 DATA 20,H,10,36,L3U,11,21,A
,23,28,W7U,10,22,A,10,19,L4U,12,
23,A,17,28,L2U,27
1550 DATA 24,H,17,31,L4U,25,25,A
,31,17,W4F,24,26,A,17,23,L6F,28,
27,H,28,17,W2F,23,28,H,23,17,W6U
,26
```

Continued on next page



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1555 DATA 1,H,38,10,W6F,8,2,A,20
,17,W2U,4,3,H,10,16,L3F,6
1560 DATA 4,H,17,20,L2F,2,5,H,14
,20,L4F,16,6,A,16,10,W3U,3,7,H,2
1,35,L0E,15
1565 DATA 8,A,10,38,L6U,1,9,A,10
,20,L3U,13,10,A,42,31,W4F,12,11,
H,20,10,W7F,14
1570 DATA 12,H,31,42,L4U,10,13,H
,20,10,W3F,9,14,A,10,20,L7U,11,1
5,A,35,21,W0E,7
1575 DATA 16,A,20,14,W4U,5,17,A,
30,40,L3U,18,18,H,40,30,W3F,17,1
9,H,20,7,W3F,20
1580 DATA 20,H,26,24,W0E,21,21,A
,24,26,L0E,20,22,A,17,28,L4U,23,
23,H,20,17,W4F,22
1585 DATA 24,A,23,35,L7U,26,25,H
,34,17,W10F,27,26,H,35,23,W7F,24
,27,A,17,34,L10U,25,28,A,7,20,L3
U,19
1590 DATA 1,H,27,21,W4F,7,2,H,28
,17,W3U,25,3,A,17,33,L4F,8
1595 DATA 4,H,27,24,W3U,5,5,A,24
,27,L3F,4,6,A,31,20,W2F,9,7,A,21
,27,L4U,1
1600 DATA 8,H,33,17,W4U,3,9,H,28
,31,L2U,6,10,A,24,42,L3F,13,11,A
,0,16,L2F,21
1605 DATA 12,A,20,14,W2U,14,13,H
,42,24,W3U,10,14,H,14,20,L2F,12,
15,H,18,10,L11F,19
1610 DATA 16,H,36,13,W10F,17,17,
A,13,36,L10U,16,18,A,10,20,L2U,2
2,19,A,10,18,W11U,15
1615 DATA 20,A,30,13,W3U,24,21,H
,16,0,W2U,11,22,H,20,10,W2F,18,2
3,H,7,24,L1U,26
1620 DATA 24,H,13,30,L3F,20,25,A
,17,20,L3F,2,26,A,24,7,W1F,23,27
,H,21,14,W6F,20,20,A,14,21,L6U,2
7
1625 DATA 1,A,20,6,W7F,20,2,A,16
,27,L2U,26,3,H,17,10,W4F,4
1630 DATA 4,A,10,17,L4U,3,5,H,23
,17,L7F,9,6,H,28,20,L7F,8,7,H,33
,17,W5F,12
1635 DATA 8,A,20,20,W7U,6,9,A,17
,23,W7U,5,10,H,24,10,W10F,14,11,
H,0,17,L4F,13
1640 DATA 12,A,17,33,L5U,7,13,A,
17,0,W4U,11,14,A,10,24,L10U,10,1
5,A,17,20,L6F,18
1645 DATA 16,H,16,13,W2F,25,17,H
,17,30,L2F,27,18,H,20,17,W6U,15,
19,H,14,27,L3F,24
1650 DATA 20,H,24,21,T3F,23,21,A
,10,20,L0E,22,22,H,20,10,W0E,21,
23,A,21,24,T3U,20
1655 DATA 24,A,27,14,W3U,19,25,A
,13,16,L2U,16,26,H,27,16,W2F,2,2
7,A,30,17,W2U,17,28,H,6,20,L7U,1
1660 DATA 1,H,13,7,W4F,2,2,A,7,1
3,L4U,1,3,H,35,17,W7F,14
1665 DATA 4,A,41,19,W2U,9,5,H,31
,21,W4F,6,6,A,21,31,L4U,5,7,A,24
,28,L2F,8
1670 DATA 8,H,28,24,W2U,7,9,H,19
,41,L2F,4,10,H,31,33,L7F,20,11,A
,0,27,L0E,12
1675 DATA 12,H,27,0,W0E,11,13,H,
27,21,L7F,21,14,A,17,35,L7U,3,15
,A,14,45,L5F,27
1680 DATA 16,A,31,14,W9F,28,17,A
,24,7,W4U,23,18,A,14,34,L0E,19,1
9,H,34,14,W0E,18
1685 DATA 20,A,33,31,W7U,10,21,A
,21,27,W7U,13,22,A,21,10,W4U,24,
23,H,7,24,L4F,17
1690 DATA 24,H,10,21,L4F,22,25,H
,35,37,L4F,26,26,A,37,35,W4U,25,
27,H,45,14,W5U,15,28,H,14,31,L9U
,16
1695 DATA 1,A,7,34,L3F,4,2,H,20,
17,L11F,28,3,A,10,38,L4U,7
1700 DATA 4,H,34,7,W3U,1,5,A,14,
33,L3F,8,6,H,13,10,L7F,17,7,H,38
,10,W4F,3
1705 DATA 8,H,33,14,W3U,5,9,H,14
,43,L5U,10,10,A,43,14,W5F,9,11,H
,18,16,L4F,22
1710 DATA 12,H,20,14,W0E,13,13,A
,14,28,L0E,12,14,H,0,32,L2F,19,1
5,H,29,17,W4F,26
1715 DATA 16,A,23,35,L4F,20,17,A
,10,13,W7U,6,18,A,20,41,L8U,25,1
9,A,32,0,W2U,14
1720 DATA 20,H,35,23,W4U,16,21,H
```

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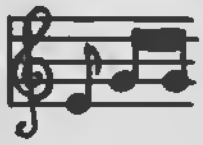
PROGRAMS FOR KIDS

CIRCUS ADVENTURE—16K
A children's adventure game with many graphics, songs, and surprises. Great family fun for all ages.- $10.00



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COMPARISON CHART	SUPER COLOR WRITER			THE COMPETITION		
System Size	4K	16K	32K	4K	16K	32K
TAPE Text space	N/A	8K	24K	N/A	2K	18K
ROMPAK Text space	2.5K	15K	31K	N/A	N/A	N/A
DISK Text space	N/A	8.5K	22.5K	N/A	0.5K	16.5K
Right Justify		YES			NO	
Video Window		YES			NO	
Edit any ASCII File		YES			NO	

The figures speak for themselves and with professional features like PROGRAMMABLE function string commands to perform up to 28 commands automatically, PROGRAMMABLE text file chaining, PROGRAMMABLE column insert & delete, and right hand JUSTIFICATION with punctuation precedence, the choice is clear but there's still more!

The **Super "Color" Writer** takes full advantage of the new breed of "smart printers" with Control codes 1-31, 20 Programmable control codes 0-255 for special needs and built in Epson MX-80, Centronics 737, 739 and R.S. Line Printer IV, VII, VIII drivers.

CHECK THESE FEATURES!!

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The Disk version of the **Super "Color" Writer** works with the TRS-80C Disk System and has all the features listed above plus many more! Use with up to four Disk Drives. Includes an extended HELP table you can access at any time. Call a directory, print FREE space, Kill disk files and SAVE and LOAD text files you've created all from the **Super "Color" Writer**. Print, merge or append any **Super "Color" Terminal** file, ASCII file, BASIC program or Editor/Assembler source listing stored on the Disk or tape. The **Super "Color" Writer Disk** version has additional formatting and print features for more control over your printer and PROGRAMMABLE chaining of disk files for "hands-off" operation. Print an entire BOOK without ever touching a thing!

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The Disk version offers all the features listed above plus Host ability in full duplex • Lower case masking • 10 Keystroke Multiplier (MACRO) buffers on disk to perform repetitive log-on tasks and send short messages (up to 255 bytes) • Programmable prompts for send next line • Selectable character trapping • Set printer line length • Pagination • Linefeed with CR option • Printer Baud: 110, 300, 600, 1200 & 2400 • Documentation

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5. Direct Run Button.
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NFL—From Page 60

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,48,17,W7U,23,22,A,16,18,W4U,11,
23,A,17,48,L7U,21
1725 DATA 24,H,3,13,L0E,27,25,H,
41,20,W8F,18,26,A,17,29,L4U,15,2
7,A,13,3,W0E,24,28,A,17,20,W11U,
2
1730 DATA 1,H,26,13,W6F,3,2,H,42
,28,W7F,9,3,A,13,26,L6U,1
1735 DATA4,A,7,17,L7F,28,5,H,9,7
,L5F,13,6,A,27,28,W7U,15,7,A,22,
24,L3F,17
1740 DATA8,H,3,19,L9F,14,9,A,28,
42,L7U,2,10,A,27,30,L8F,23,11,H,
17,28,L3F,12
1745 DATA12,A,28,17,W3U,11,13,A,
7,9,W5U,5,14,A,19,3,W9U,8,15,H,2
8,27,L7F,6
1750 DATA16,H,20,10,W9F,22,17,H,
24,22,W3U,7,18,H,30,17,W2U,20,19
,A,27,24,W9U,25
1755 DATA20,A,17,30,L2F,18,21,H,
31,27,L6F,24,22,A,10,20,L9U,16,2
3,H,30,27,W8U,10
1760 DATA24,A,27,31,W6U,21,25,H,
24,27,L7F,19,26,A,17,20,L0E,27,2
7,H,20,17,W0E,26
1765 DATA28,H,17,7,W7U,4
1770 DATA1,H,14,17,L5F,27,2,A,13
,22,L4U,5,3,A,21,34,L4U,4
1775 DATA 4,H,34,21,W4F,3,5,H,22
,13,W4F,2,6,H,27,10,W8F,9,7,A,17
,27,L0E,11
1780 DATA 8,A,26,7,W3U,19,9,A,10
,27,W8U,6,10,H,22,20,L6F,12,11,H
,27,17,W0E,7
1785 DATA 12,A,20,22,W6U,10,13,H
,19,17,L4F,20,14,A,24,34,L4U,24,
15,A,17,14,W3U,16
1790 DATA 16,H,14,17,L3F,15,17,H
,42,21,W3F,18,18,A,21,42,L3U,17,
19,H,7,26,L3F,8
1795 DATA 20,A,17,19,W4U,13,21,A
,13,20,L7U,26,22,H,20,10,W7F,23,
23,A,10,20,L7U,22
1800 DATA 24,H,34,24,W4F,14,25,A
,41,10,W7F,28,26,H,20,13,W7F,21,
27,A,17,14,W5U,1
1805 DATA 20,H,10,41,L7U,25
1810 DATA1,A,21,24,L5F,14,2,A,20
,23,W4U,13,3,H,17,16,L3F,11
1815 DATA4,A,40,17,W4U,10,5,A,14
,27,L4U,15,6,A,30,27,W2U,7,7,H,2
7,30,L2F,6
1820 DATA8,A,41,14,W4F,9,9,H,14,
41,L4U,8,10,H,17,40,L4F,4,11,A,1
6,17,W3U,3
1825 DATA12,H,13,16,L8F,23,13,H,
23,20,L4F,2,14,H,24,21,W5U,1,15,
W,27,14,W4F,5
1830 DATA16,A,52,10,W5F,18,17,H,
33,31,L3F,21,18,H,10,52,L5U,16,1
9,A,24,26,T2U,24
1835 DATA20,H,25,10,W4F,22,21,A,
31,33,W3U,17,22,A,10,25,L4U,20,2
3,A,16,13,W8U,12
1840 DATA24,H,26,24,T2F,19,25,A,
14,17,L2F,27,26,H,13,21,L11F,28,
27,H,17,14,W2U,25
1845 DATA28,A,21,13,W11U,26
1850 DATA1,A,34,20,W5U,25,2,A,15
,12,W4U,27,3,A,10,23,L5U,12
1855 DATA4,H,24,10,W3F,26,5,A,0,
24,L5F,18,6,H,17,33,L5F,11,7,H,6
,17,L2F,8
1860 DATA8,A,17,6,W2U,7,9,A,13,3
8,L14U,16,10,A,23,44,L6F,14,11,A
,33,17,W5U,6
1865 DATA12,H,23,10,W5F,3,13,A,2
4,7,W2F,22,14,H,44,23,W6U,10,15,
A,24,27,L4F,21
1870 DATA16,H,38,13,W14F,9,17,A,
30,27,W2U,19,18,H,24,0,W4U,5,19,
H,27,30,L2F,17
1875 DATA20,H,20,10,W9F,28,21,H,
27,24,W4U,15,22,H,7,24,L2U,13,23
,A,17,21,L3U,24
1880 DATA24,H,21,17,W3F,23,25,H,
20,34,L5F,1,26,A,10,24,L3U,4,27,
H,12,15,L4F,2
1885 DATA28,A,10,20,L9U,20
1890 DATA 1,A,32,10,W2U,2,2,H,10
,32,L2F,1,3,H,24,27,L6F,20
1895 DATA 4,H,38,21,W4F,13,5,H,2
0,17,L7F,7,6,A,15,16,W2U,8,7,A,1
7,20,W7U,5
1900 DATA 8,H,16,15,L2F,6,9,H,24
,35,L2U,18,10,A,55,21,W2U,11,11,
H,21,55,L2F,10
1905 DATA 12,H,40,13,W7F,14,13,A
,21,38,L4U,4,14,A,13,40,L7U,12,1
5,H,24,10,W7F,17
1910 DATA 16,H,10,20,L9F,19,17,A
,10,24,L7U,15,18,A,35,24,W2F,9,1
9,A,20,10,W9U,16
1915 DATA 20,A,30,31,W4U,25,21,A
,23,7,W2F,23,22,H,37,3,W4F,24,23
,H,7,23,L2U,21
1920 DATA 24,A,3,37,L4U,22,25,H,
31,30,L4F,20,26,H,31,33,L3F,27,2
7,A,33,31,W3U,26,28,A,27,24,W6U,
3
1925 DATA 1,H,24,0,W7F,26,2,H,21
,41,L2U,4,3,H,27,31,L4F,25
1930 DATA 4,A,41,21,W2F,2,5,H,21
,14,W5F,17,6,H,13,10,W2U,16,7,H,
20,27,L4F,18
1935 DATA 8,H,25,0,W12F,9,9,A,0,
25,L12U,8,10,H,34,17,W4F,13,11,A
,32,31,L2F,14
1940 DATA 12,A,10,27,L3U,21,13,A
,17,34,L4U,10,14,H,31,32,W2U,11,
15,H,10,9,L14F,23
1945 DATA 16,A,10,13,L2F,6,17,A,
14,21,L4U,5,18,A,27,20,W4U,7,19,
A,10,17,L5U,27
1950 DATA 20,H,23,35,L7F,24,21,H
,27,18,W3F,12,22,A,31,14,W1F,20,
23,A,9,10,W14U,15
1955 DATA 24,A,35,23,W7U,20,25,A
,31,27,W4U,3,26,A,0,24,L7U,1,27,
H,17,10,W5F,19,28,H,14,31,L1U,22
1960 DATA 1,A,27,30,L4F,11,2,A,1
3,17,L1U,3,3,H,17,13,W1F,2
1965 DATA 4,H,3,21,L7F,27,5,A,28
,27,W5U,10,6,H,24,14,W6F,7,7,A,1
4,24,L6U,6
1970 DATA 8,A,23,27,L8F,14,9,H,1
3,37,L12U,15,10,H,27,20,L5F,5,11
,H,30,27,W4U,1
1975 DATA 12,A,13,16,W4U,13,13,H
,16,13,L4F,12,14,H,27,23,W8U,8,1
5,A,37,13,W12F,9
1980 DATA 16,A,13,15,L4F,17,17,H
,15,13,W4F,16,18,H,30,3,W7F,28,1
9,H,10,7,L4F,26
1985 DATA 20,A,9,10,L4F,23,21,A,
17,31,L3F,24,22,H,24,23,W2U,25,2
3,H,10,9,W4U,20
1990 DATA 24,H,31,17,W3U,21,25,A
,23,24,L2F,22,26,A,7,10,W4U,19,2
7,A,21,3,W7U,4,28,A,3,30,L7U,18
1995 DATA 1,H,10,17,L0E,4,2,H,13
,14,W3U,8,3,A,6,28,L8U,27
2000 DATA 4,A,17,10,W0E,1,5,A,19
,10,W4F,7,6,A,17,7,W1U,12,7,H,10
,19,L4U,5
2005 DATA 8,A,14,13,L3F,2,9,A,14
,38,L14U,17,10,A,24,23,L3F,22,11
,H,6,23,L7F,23
2010 DATA 12,H,7,17,L1F,6,13,H,2
3,13,W8F,14,14,A,13,23,L8U,13,15
,H,21,10,W4F,16
2015 DATA 16,A,10,21,L4U,15,17,H
,38,14,W14F,9,18,H,18,20,L4F,19,
19,A,20,10,W4U,18
2020 DATA 20,A,7,45,L4U,21,21,H,
45,7,W4F,20,22,H,23,24,W3U,10,23
,A,23,6,W7U,11
2025 DATA 24,A,35,7,W3F,20,25,A,
16,21,L3F,26,26,H,21,16,W3U,25,2
7,H,20,6,W8F,3,28,H,7,35,L3U,24
2030 DATA 1,A,20,21,L0E,3,2,A,21
,42,L0E,14,3,H,21,20,W0E,1
2035 DATA 4,A,30,20,W0E,25,5,A,6
,16,L3U,6,6,H,16,6,W3F,5,7,A,21,
23,L6F,9
2040 DATA 8,H,20,3,W4F,24,9,H,23
,21,W6U,7,10,H,23,10,W7F,11,11,A
,10,23,L7U,10
2045 DATA 12,A,10,6,W2U,20,13,A,
```

Concluded Next Page

NEE—From Page 63

```
24,35,L4F,23,14,H,42,21,W0E,2,15
,A,10,13,L3F,19
2050 DATA 16,H,38,0,W8F,18,17,A,
30,7,W0E,26,18,A,0,38,L8U,16,19,
H,13,10,W3U,15
2055 DATA 20,H,6,10,L2F,12,21,H,
17,20,L6F,22,22,A,20,17,W6U,21,2
3,H,35,24,W4U,13
2060 DATA 24,A,3,28,L4U,8,25,H,2
8,30,L0E,4,26,H,7,30,L0E,17,27,A
,21,17,L7F,28,28,H,17,21,W7U,27
2100 FOR I=0TO7:READE$
2105 POKE &H603+I,VAL("&H"+E$):N
EXT
2110 DEF USR0=&H603:X=USR0(&H60C
):GOTO15
```

Software Review...

VIKING Will Provide Hours Of Fun For You

Who among us ever wondered whether we had the ability to run a country or a kingdom without any problems? Or, put another way, have you ever thought you could certainly run your country better than its present leaders?

VIKING gives you an opportunity to find out. And, as we discovered—much to our chagrin—its not all that easy to keep things on an even keel. In fact, it is right difficult.

The program is a simulation for one to four players, each having an opportunity to balance things out and run a kingdom. You begin things with some land, a few people, and some soldiers—not to mention the power to levy taxes. If that seems to make it simple, it isn't.

You have the opportunity to buy stores, invest in a fishing fleet and, of course, to spruce up your surroundings. The problem is that it takes money to do all this, and if the harvest isn't good, the fishing poor and the mercantile trade off (a recession?) then things can get complicated.

You have to feed the populace, and that costs money. Of course, you can always raise taxes, but that can drive people away. And if the people don't get enough to eat, they just might go traveling someplace else. That reduces your ability to collect taxes and harvest food, *et cetera*.

Let's add in a few bandits, some disease, revolts and the like. Ah, heavy weighs the head that wears the crown.

VIKING brings all these things to bear in an interesting and thought-provking simulation. It is easy to play, gives enough updates to tell you what your status is, and can give some good, healthly competition along the way. The program provides a new set of circumstances each time, so it is always new and always a challenge.

We liked this one.

(Prickley-Pear Software, 3518 S. Randi Place, Tucson, AZ, 85730, $19.95)

Software Review...

MPP Course Has All You Need To Get Things Going

For those of you who followed the Motion Picture Programming course in **the RAINBOW** the past few months, you know that there is a whole range of possibilities open to you for graphics, antimation and the like which is totally different than the standards things which you get in the GET, PUT, LINE, CIRCLE, DRAW and other commands that produce graphics.

While this is certainly not to say that the graphics commands do not serve a fantastic purpose—they do. And the excellent graphics commands which Tandy made a part of the 80C's "vocabulary" when they ordered the ROM chips, make our computer *the* easiest to program for graphics on the market. Yet, it can sometimes be a great deal of trouble to program in graphics, and it is sometimes a whole lot easier to just draw them on the screen.

Several drawing programs are available, including the *DRAWER* program from *Chromasette* magazine. That program is the basis for *MPP TUTORIAL*, an excellent package which wraps in all the material which was available in **the RAINBOW** series, and some more as well.

One of the major things which *MPP TUTORIAL* has is a copy of the *DRAWER* program. There are added instructions for operating it and for creating what you wish to create on the screen. Then, there is a full set of MPP instructions, showing how to interface the graphic program you have with a BASIC program and put the whole thing together.

Some of the effects of MPP are quite spectacular and this course gives you all the help you need. Its laid out in a clear 1-2-3 method that should be easy to follow for just about anyone. If you are into graphics and moving pictures, we can recommend MPP to you. And *MPP TUTORIAL* is just the ticket to get things going for you.

Yes, you can take the information from **the RAINBOW**, purchase the *DRAWER* program from *Chromasette*, and have most of this information at hand. But, *MPP TUTORIAL* has the advantage of putting it all in one package for you and gives you a few added extras to help you master this graphic and antimation concept throughly.

(Superior Graphics Software, 406 Little Mountain Road, Waynesville NC 28786, $34.95 tape or disk)

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For the TRS-80 Color Computer. Available on disk with an accompanying manual from **Software Options**, 19 Rector Street, New York, N.Y. 10006. 212-785-8285. **Toll-free order line: 800-221-1624.** Price: $49.95 (plus $3.00 per order shipping and handling). New York State residents add sales tax. Visa/Mastercard accepted.

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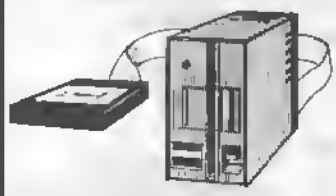

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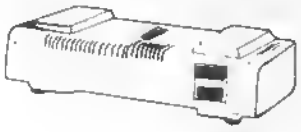

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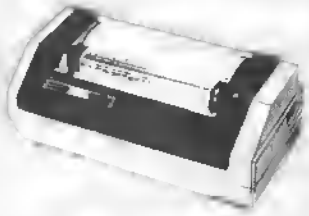

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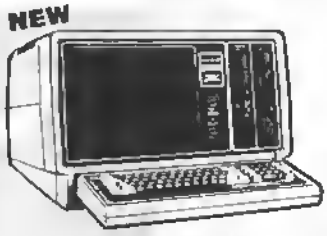

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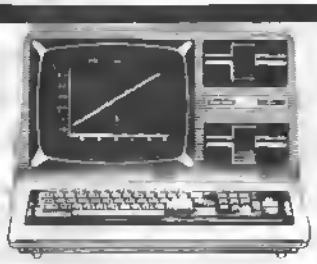

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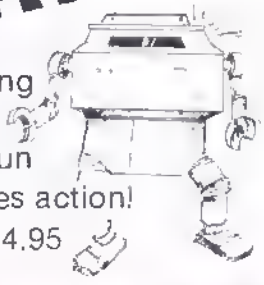

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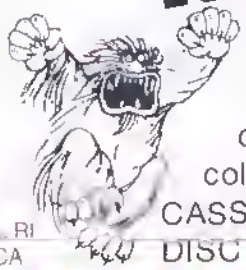

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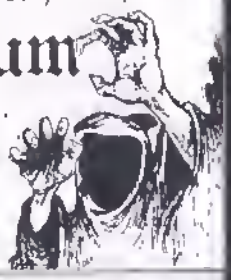

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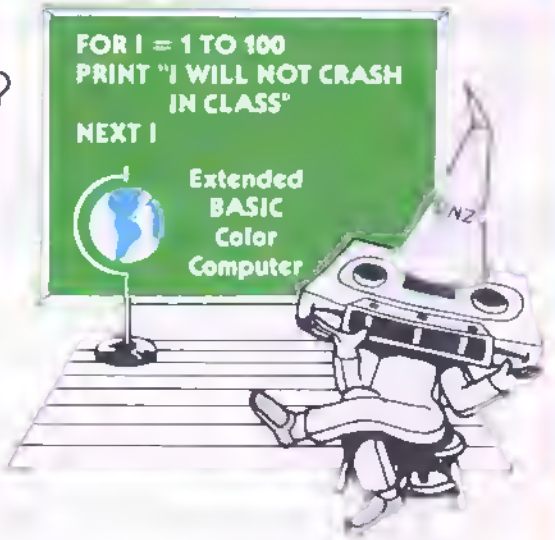

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